Modern Machine Shop



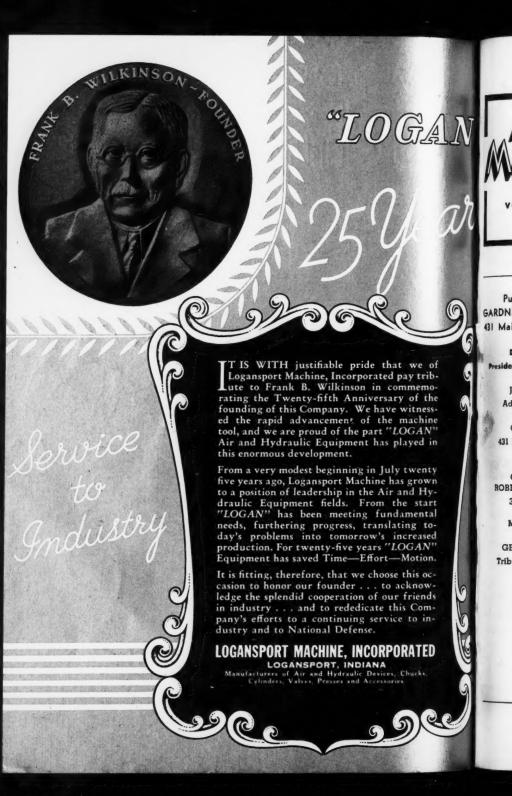


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Machine Shop

VOLUME 14 . NUMBER 2

JULY, 1941



HOWARD CAMPBELL, Editor

Pubished monthly by GARDNER PUBLICATIONS, Inc. 431 Main St., Cincinnati, Ohio

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President and General Manager

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431 Main St., Cincinnati
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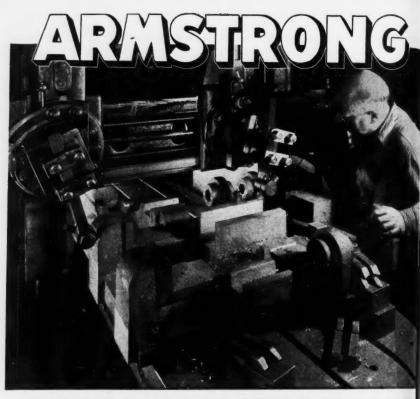


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Machine Shop

CINCINNATI, OHIO

JULY, 1941

Vol. 14, No. 2

We Present --

—as the feature article in this month's issue—some of the interesting testing and manufacturing operations involved in the building of "Lockheed" fighting planes for the U. S. Army. Nothing less than perfection will do for this job.

-on page 90—the concluding section of J. T. Beard's article "How Effective Is Your Cutting Oil." In this section Mr. Beard presents four more tables showing the results in tool life, finish, and chaser wear that are obtained by eight different types of oil on different types of materials. This is one of those rare articles containing good, practical information on what to do about your cutting oil problem.

-on page 108-a description of a modern balancing machine in which the principles of radio construction are used to locate points of unbalance in a revolving workpiece. Another practical application of scientific principles.

—on page 120—the fourth and last article on "Properties of Metals" by Austen J. Smith. In this series Mr. Smith has presented the basic principles upon which the science of metallurgy is founded. The number of requests we have had for extra copies of these articles indicates that the modern plant executive is aware of the importance of this factor in present-day manufacturing.

—an especially good assortment of "Ideas from Readers" this month, plus a number of timely "Tools for National Defense," and the other usual features. See yourself at the "Company Picnic" on page 294.

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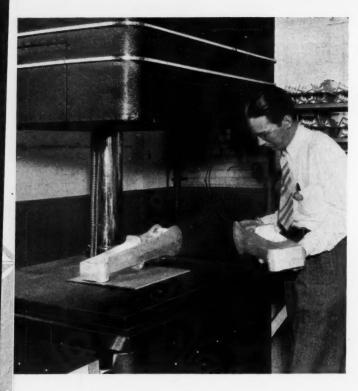


Fig. 1 — Each Part Upe Which any Stress May h double Sure that it Has no Crack Blow-Holes, or Other Defect similar

By HOWARD CAMPBELL

Editor

MODERN MACHINE SHOP

Lockheed Mobilizes a care for Defense

Presenting a few of the many interesting operations the building of Lockheed Airplanes

DURING the twelve months just past, the production of aircraft by American manufacturers has trebled. Or perhaps we should put it this way; the production of planes during the first three months of this year equalled the production of all of

1940 put together. And our airplan plants have just begun to produce On May fifth the Office of Production Management announced that during Management announced that during lig. 2—Te the month of April military aircra tion from manufacturers produced 1,427 and or Fuselage planes, and in the next few month

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the monthly output of planes will be doubled again.

Among the foremost of American airplane manufacturers is the Lockheed Aircraft Corporation, Burbank, California. This firm is noted both for the huge size of its plant and modern manufacturing facilities, and for the high quality of its product. Lockheed fighting planes are said to he superior to those of any foreign manufacturers, so far as efficiency of design and speed are concerned.

All-metal construction is a feature of the Lockheed plane, both for safety and for maintenance in service. Thousands of aluminum alloy rivets are used in each plane, and each rivet is driven individually by hand and individually inspected. Welding, also, is extensively used in the fabrication of the Lockheed plane, both electric and

gas welding being used.

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Each and every part that goes into the construction of a Lockheed plane is carefully inspected before use and as carefully tested if there is any question as to its fitness for the job. Every man in the Lockheed plant is constantly aware of the fact that the failure of a part may mean the failure of a plane, and the failure of a plane may mean the loss of a battle, or a ship-load of materials or men. Consequently nothing is left undone which might ensure the soundness of the parts and the excellence of the workmanship that goes into the building the fighting ships for the United States defense forces.

All parts such as castings or forgings upon which a considerable amount of stress may be placed are examined inside as well as outsideinside, by taking X-ray photographs which clearly show any cracks, blowholes, or other defects which may not be visible by examination of the exterior of the piece. The X-ray pictures, or "radiographs," are taken in the Triplett & Barton X-ray ma-

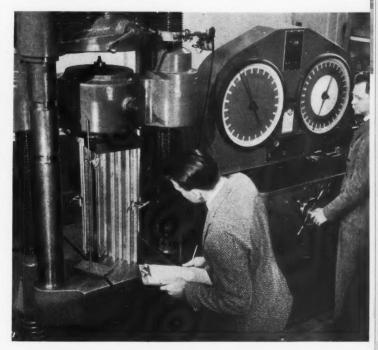


Fig. 2—Testing a Sec-tion from the Wing aircra tion from the or Fuselage to Determine the Ultimate Strength

July, 19 July, 1941



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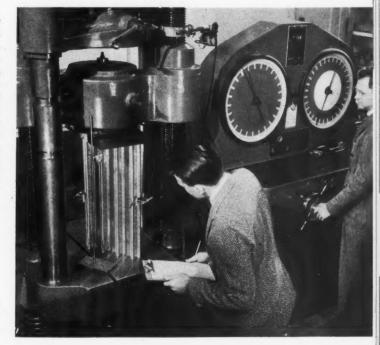


Fig. 2—Testing a Section from the Wing or Fuselage to Determine the Ultimate Strength

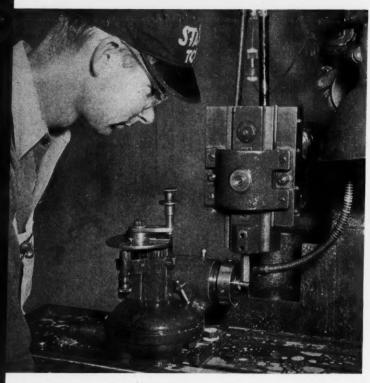


Fig. 3—Cutting Serrations in a Carburstor Stud, using a Van Norman Miller Equipped with a Slotting Attachment

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chines, one of which is shown in Fig. 1. To take the X-ray picture, the X-ray film is enclosed in a "casette" or holder, and placed on the table of the machine. The workpiece is then laid on the casette, the upper part of the housing is lowered to completely enclose the work and film, and current is applied to the X-ray tube which is located in the upper half of the housing. It will be noted that the construction of the machine is such that it is unnecessary to operate the machine in a dark-room, and the machine housing is lined with lead, making it unnecessary to do this work in a lead-lined room in order to safeguard the health of the operaters. The machine is entirely safe to

operate, and can be set up and operated in daylight, as shown.

The machine shown is one of a battery of four, all fully automatic. With a capacity of more than 5,000 parts per day, the machine represents

the latest development in this means of scientific inspection. It is approximately 10 feet high and 4 feet square. Approximately 1,000 14 x 17-inch X-ray negatives are used daily, and a two-months' supply of film is kept on hand constantly in an air-conditioned room, the temperature of which is maintained at about 42 degrees F.

The automatic machines are operated by robot control. When a piece is in position for a radiograph, the control is turned on and the cabinet is automatically lowered into place. At this point the current is applied and the exposure is made. Upon completion of the exposure, the cabinet is automatically raised and the conveyor table, bearing the work-

piece, out fre the hoo a new be mo posit X-rayin matic makes i to expo ative a The machine principa smaller that are placed matic n room co machine inches v parts br are nun spection radiogra each pa

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4 - Boring the Fig. 4 — Boring the Radius in the End of Assembly Horn for the Empennage Using Elevator, Using Craley Adjustable Boring Head

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piece, is moved out from under the hood so that a new piece can be moved into position for X-raying. Automatic operation makes it possible to expose a negative a minute.

The automatic machines are used

principally on light alloy parts, smaller castings, and forgings. Parts that are too large to be conveniently placed under the hood of an automatic machine are sent to an X-ray room containing a 440,000-volt X-ray machine which is 6 feet long by 30 inches wide and 50 inches high. All parts brought in for X-ray inspection are numbered and stamped after inspection to show that they have been radiographed. A record is kept of each part so that in event of failure or for fatigue research or production control the history of the part may be traced. With the four automatic machines as high as 20,000 castings are X-rayed in a 24-hour day.

The illustration Fig. 2 presents an-

other important piece of laboratory equipment. This is a machine for determining the load or pressure required to shear or crush a part and it is by making and recording such tests that the twin objective of strength plus light weight can be achieved. The illustration shows the laboratory technicians in process of testing a section of wing or fuselage structure to determine the maximum load that can be applied before the section will fail; in other words, the "crushing load." The amount of power applied is indicated by the hands on the dials; thus an accurate record can be made of the maximum pressure at the instant of failure. Comparisons of maximum loads ap-

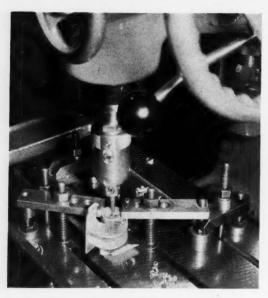


Fig. 5 — Boring the Hub of Bracket for an Air Scoop Door. In Machine is a Moore Jig-Boring No. chine, and the Tool is Carbolog

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plied to the different types of construction aid the designers in determining the safest types of construction for use.

Among the interesting manufacturing operations is that of cutting serrations in the carburetor stud, shown in process in Fig. 3. The stud is of steel, and there are 24 notches cut

into the side of the stud to a depth of 1/32 inch, the stud being revolved 15 degrees between cuts. The operation is performed in a Van Norman milling machine equipped with a slotting at-

tachment, as shown. A "Mo-Max" tool is used, which will withstand wear for the cutting of a large number of studs and thus assure clean accurate cutting.

Another operation for which a Van Norman miller is used is shown in process in Fig. 4. Here a miller is shown equipped with a Craley adjustable boring head for boring the radius in the end of a Horn assembly

for the empennage elevator-an operation which must be absolutely accurate. When finished, the radius is 2.500 inch, within a limit of 0.002 inch. The elevator is an aluminum alloy casting, which combines a high degree of strength with the light weight which is so desirable in air-

plane construction. The fine adjust-

Fig. 6 — Machining the Shaft Hole in the Main Landing Gear Shock Strut Fulcrum

Fig. 7—Straddle-Milling the "Ears" on the End of the Fulcrum, Using a Set of Interlocking Milling Cutters

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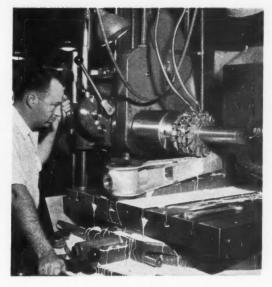
adjust-

ment available in the Craley boring head makes possible a fine degree of accuracy on jobs of this kind.

Another boring operation is shown in process in Fig. 5—that of boring the hub of a bracket for an air scoop door. Again the part is an aluminum alloy casting. The machine used for this operation is a Moore jig-boring machine, equipped with an adjustable boring head with which a fine adjustment

can be obtained. Using a Carboloy boring tool, the hole is bored to a depth of % inch and a diameter of 0.686 - 0.687 inch, or within a limit of 0.001 inch.

Drilling and boring the shaft hole in a main landing gear shock strut fulcrum is an operation that calls for close accuracy and good finish, conse-



quently this operation is performed in a horizontal boring machine as shown in Fig. 6. The fulcrum is locked in a fixture with the hole in the large end of the piece fitting over a locating pin, as shown, and the opposite end clamped in position so that the hole will be exactly at right angles to the cross hole in the large end. The cross

hole is finished to 3.000 inches. plus 0.002, minus 0.000 inch and the horizontal hole in process of being finished in the illustration will be 1.874-



Fig. 8—All Parts that are to be Exposed are Weather-Proofed by Spraying Them with a Coating of Zinc Chromate

1941



Fig. 9—Using a Delta Dril ing Head to Drill 225 Holm in a Bulkhead Sheet

1.875 inch when reamed.

With the holes in the landing gear fulcrum bored and reamed, the fulcrum is set up in a fixture on the table of the horizontal boring machine shown in Fig. 7 and the "ears" on the end of the fulcrum are finished on both sides by milling with a set of "Go-and-Go" milling cutters. The operation is comparatively simple, with a limit of 0.005 inch on the thickness of the ears. The main feature of this operation is the use of a machine of sufficient rigidity to

eliminate the possibility of vibration and thus assure a smooth surface.

To preclude the possibility of corrosion, all metal parts that are to be exposed are sprayed with a protective

solution of zinc chromate. The parts are placed in position for spraying on a conveyor which carries them through the DeVilbis paint spray booth shown in Fig. 8 where an oper-

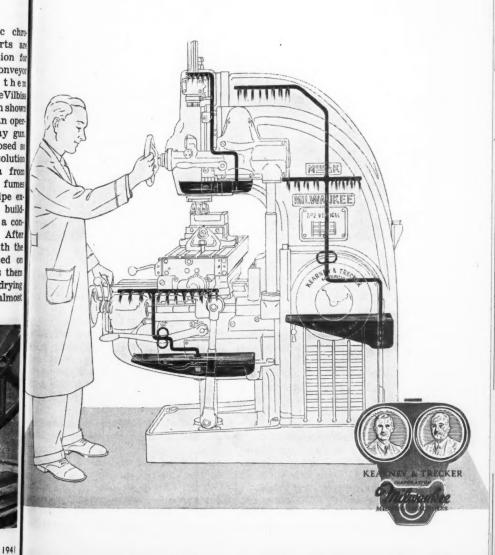
ator sprays them with a spray gun The booth is sufficiently enclosed so that the fumes from the zinc solution are confined to a close area from which a large fan draws the fumes and expels them through a pipe extending to the exterior of the building. Excess spray is spent in a continuous-flowing water wash. After the parts have been coated with the zinc chromate, they are placed of another conveyor which carries them beneath a battery of infra-red drying lamps which dry the coating almost



Fig. 10 — Routing Parts for the Wing Section. The Tool Operates at a Speed of 16,000 R.P.M.

elta Dril 225 Hola Sheet Lubrication—vital to the life of any machine—is provided in the Milwaukee Milling Machine by automatic pressure pumps in the column and knee, and in the sliding head on vertical machines. Automatic pump lubrication of this type requires only a minimum of attention.

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MILWAUKEE MILLING MACHINES



Fig. 11—Center Sections are Assembled in Huge Jigs Such as the One Shown Here, Whid Ensure Correct Construction and Accuracy in Dimensions

instantly. Shown at the right in the illustration, this conveyor travels at a rate of 30 feet per minute. The lamp batteries are underneath the hoods suspended over the central portion of the conveyor. All parts that are to be used in the internal construction of the plane are anodized to protect against hidden corrosion.

The operation of drilling a bulk-head sheet is shown in Fig. 9. This sheet, which is of dural, is laid on a wood base and the jig is positioned over it, where it is clamped as shown. There are 225 holes in this sheet, in such irregular pattern that, unless a drilling head could be used which could drill all holes at once—which would be a huge head—it is simpler

to drill each hole individually in the manner illustrated.

The machine is a Delta drilling machine head, suspended from a swinging arm which makes it practically a "post" type of drill and with which all parts of the work-piece can easily be reached for drilling. A Magic chuck is used to expedite the changing of drills during the operation, and the drills are kept at hand by inserting them into holes in a steel plate which is attached to the side of the drill head, as shown in the illustration.

Figure 10 is a picture of an operator at work routing parts for a wing section. The sheet stock is drilled for bolts, then several sheets of material

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The convenience and sound design of the SUPER SERVICE Radial Drilling Machine facilitate faster production, safer operation, and a long life.

For your analysis of the SUPER SERVICE Radial's points of superiority, send for Bulletin R-24 that explains, point by point, the construction and production advantages of this machine. In this bulletin you will learn how 36 speeds and 18 feeds are obtained with only 17 gears, why there is less manipulation and more time for drilling, the advantages of constant speed driving motor, and many more outstanding qualities of the SUPER SERVICE Radial Drilling Machine.

THE CINCINNATI BICKFORD TOOL CO. DAKLEY, CINCINNATI, OHIO, UNITED STATES OF AMERICA

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are bolted to the table of the routing machine with the pattern bolted on the top layer. Then using either an Onsrud router or a machine made by the U. S. Electrical Manufacturing Company, the sheets of steel stock are routed to the shape of the pattern. The cutting tool is a 21/64-inch routing tool, which operates at a speed of approximately 16,000 r.p.m.

The motor head in which the routing tool is chucked is attached to a jointed swinging arm that is attached to a post so that the cutter can be swung to any part of the table. Coolant is employed to facilitate cutting and conserve the tool.

Center sections are built in huge jigs such as that shown in Fig. 11, where a number of workmen can be seen at work on a half-assembled center section. The jig is so constructed that every part that goes into the assembly must be located in correct relation to all other parts, thus assuring that the pieces will be properly placed and properly anchored together and that the overall dimensions will be observed. In addition, the jig makes its convenient for the workmen to work comfortably on all parts of the center section.

The operations that have been presented in the foregoing article are but a few out of the many hundreds of operations that are necessary to the construction of Lockheed planes as "Lockheed Mobilizes for Defense"

Revere Awards

TOPS of a field of more than 2,000 entries, nine typical American workmen were notified June 1 that they were winners in the \$10,000 Revere Award for the best contributions made by workers at the bench to America's defense plans, both military and industrial.

Winner of the first prize of \$5,000 was Eugene Phillips of Fort Worth, Tex., creator of a system for the blind landing of airplanes. The second award of \$2,500 went to William R. Holcomb of Burbank, Cal., for his invention of an electro-magnetic riveting gun. The third prize of \$1,000 was awarded to Oscar B. Leibst, Seattle, Wash., for a structural design eliminating the use of rivets and clips.

The inventions which drew the first, second and third awards are of direct interest to the U. S. Army and Navy. The inventions winning the second and third awards relate to speeding up aircraft production.

In addition to the three top prizes, cash awards of \$250 each went to the following:

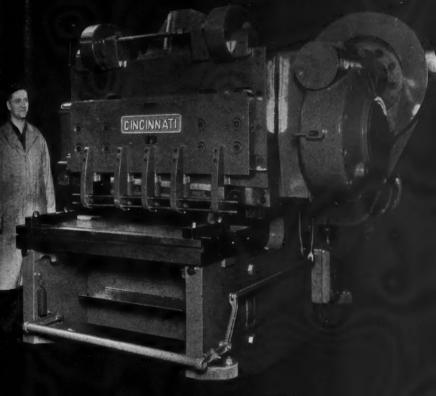
D. L. Wright, McComb, Ohio; Joseph A. Chyba, Baltimore, Md.; Martin J. Madison, Baltimore, Md.; Marcus A. Campbell, Saginaw, Mich.; John J. Kuettel, St. Paul, Minn.; Clayte B. Barbee, N. Hollywood, Cal.

Mr. Wright's invention relates to speeding up the production of vital ammunition supplies. Mr. Chyba's idea relates to conserving the vital alloys used in machine tools and freeing the machine tool industry for more important work. The other prize-winning ideas were concerned with the safety and operating efficiency of motor transportation, increasing the effectiveness of bonded metals, and an ingenious device to eliminate manual labor in the assembling of mechanisms using nuts.

The Revere Award was created as a Nobel Prize for working men in December, 1940, by C. Donald Dallas President of Revere Copper and Brass Incorporated. can be ed cen tructed nto the Correct nus aspropred to dimendition. for the on all en prele are ndreds ary to planes fense." prizes. to the ; Jos-Mar-Mar-Mich.; Minn.; , Cal. es to vital yba's vital freefor other erned , innded e to asuts. d as

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Short . . . rugged . . . dependable, this Cincinnati All-Steel Shear fills a definite need in steel, and brass, rolling mills. Features include hydraulic holddowns, automatic lubrication, 30 strokes a minute, all-steel construction.

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HERE, for example, is an "American" in one of our most prominent shops actually producing four (4) times more work than the fairly modern machine it replaced. In hundreds of plants "American" Multi-Production Lathes are lightening the burden of higher wages, shorter hour increased taxes and inexperienced operators. That why "Americans" are the choice of cost-minded production men. The many productive features responsible for such results are clearly illustrated and described by our new bulletin No. 444.

THE AMERICAN TOOL WORKS COMPANY

CINCINNATI, OHIO, U.S.A.

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These new tools and services are Warner and Swasey's practical contributions to production demands which confront turret lathe users today. Perhaps we can help you! Write

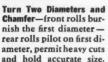
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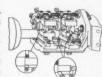
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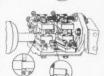
Turn Two Diameters, Chamfer and Start Drill — front rolls set behind first cutter burnish the large diameter—rear cutter block turns and chamfers and rear rolls assure accurate size—start drill is held in the turret.

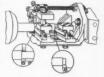


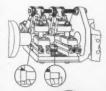
Turn Two Diameters at the Same Time — anti-friction rolls set behind the first cutter burnish the cut, producing a fine finish. Adjusting screws in the cutter blocks make cutter setting easy.

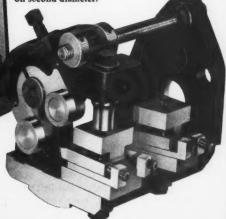
Turn Three Diameters and Chamfer — front cutter block is reversed because diameters are close together—rear cutter block holds turning and chamfering cutter—front rolls set behind first cutter to burnish—rear rolls pilot on second diameter.











How Effective Is Your Cutting Oil?

(Conclusion)

By J. T. BEARD

Socony-Vacuum Oil Company, Incorporated

Effects of Chlorine

Although the use of sulphurized-fat bases may improve the extreme-pressure and anti-weld characteristics of straight mineral oils or sulphurizedmineral oils, it is not possible to increase these characteristics beyond a certain point by the mere addition of sulphurized-fat. Where conditions require more effective extreme-pressure and anti-weld ingredients, such as in the threading of soft, draggy metals, where the accumulation of built-up edge is usually excessive, the addition of a chlorinated base to a sulphurized-mineral oil, or the addition of a chlorinated-sulphurized base to either a straight mineral oil or sulphurizedmineral oil, promotes smooth chip flow and keeps the built-up edge mo-The tool life, finish and chip wear obtained with such an oil is compared in Table V with the tool life, finish, and chip wear obtained without chlorine in the threading of draggy steel. It will be noted that the best performance was obtained with a chlorinated product.

Threading Heat-Treated Bar Stock

Steels such as SAE 3135 and SAE 3140 are commonly used in the manufacture of gears, crankshafts, cylin-

der studs, and so on, and are frequently heat treated to a fairly high Brinell before machining. At 279 Brinell this material has a tensile strength of approximately 140,000 pounds per square inch, a yield point of 120,000 pounds, and an elongation of 17 per cent in 2 inches. In other words, it is not ductile but is in a more or less semi-brittle condition. Since cutting pressures are high, and since the plastic flow of the chip is very irregular, the lip of the tool is subjected to a severe pounding action. This is brought out in Fig. 4.

In threading this material, the chaser is materially and rapidly deflected against the work, thus bringing considerable pressure on the ridges where exceptional lubricity is required in order to prevent excessive wear. Moreover, the built-up edges that are formed on the lips of the chasers are relatively small and afford very little protection to the cutting edges. A certain amount of sulphur is necessary in order to promote smooth chip flow and minimize tool vibration.

An excessive amount, however, robs the cutting edge of its protection and shortens the tool life. In addition to sulphur, a considerable amount of fat is required in order to prevent excesout a D develop

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sive wear on the ridges. If a sulphurized-fat base or chlorinated base of any kind is added to a sulphurizedcured with the addition of a sulphurized-fat or some form of chlorinated. sulphurized base to a straight mineral oil.

TABLE VI

Effectiveness of Various Types of Oils Same Viscosity

Threading SAE 3140 Bar Stock (279 BHN)

| Type of Oil | Tool Life | Finish | Chaser Wear Per Min. |
|---|-----------|--------|-------------------------|
| Sulphurized- Mineral Oil | 80 Min. | 2.3 | .0017" |
| Sulphurized- Mineral Oil and Sulphurized-Fat | 50 Min. | 2.1 | . 0025" |
| Straight- Mineral Oil and Sulphurized-Fat | 90 Min. | 4.3 | .0015" |
| Sulphurized- Mineral Oil and Chlorinated-Base | 46 Min. | 2.0 | . 0032" |
| Sulphurized- Mineral Oil and No. 1 Chlorinated- Sulphurized-Base | 41 Min. | 1.2 | .0020" |
| Sulphurized- Mineral Oil and No. 2 Chlorinated- Sulphurized-Base | 50 Min. | 1.6 | .0026" |
| Straight- Mineral Oil and No. 1 Chlorinated- Sulphurized Base | 87 Min. | 4.0 | .0011" |
| Straight- Mineral Oil and No. 2 Chlorinated- Sulphurized Base | 82 Min. | 4.5 | .0018" |

mineral oil, the excessive amount of extreme-pressure and anti-weld ingredients reduces the built-up edge to almost nothing and results in low tool life, poor finish, and excessive chaser wear. The best performance is se-

Threading Hot Rolled Bar Stock

Hot rolled SAE 1020 is commonly used for tough, fairly light - duty machined parts of all kinds. At a Brinell hardness of 122, this material has a tensile strength of approximately 60,-000 pounds per square inch, a yield point of 30,-000 pounds, and an elongation of 35 per cent in 2 inches. This is a soft, draggy metal, somewhat difficult to thread without tearing. Cutting pressures are moderate, but there is always a considerable built-up edge on the lips of the chasers. Plenty of anti-weld ingredients are required in order to keep this build-up mobile; otherwise an excessive amount will accumulate and will

slough off between the chasers and the threads and produce a poor finish.

Although the plastic flow of the chip is relatively smooth, a certain amount of lubricity is desirable to minimize wear on the ridges of the

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Against the Stealthy Invasion

HE dangerous, insidious thing about salt loss is its silent, unseen undermining of efficiency. As workers sweat, salt is lost from their bodies. As the natural salt balance is disturbed, they tire, make mistakes, feel out of sorts. And, production suffers.



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TABLETS -Case of 9000

Combination Salt-Dextrose Tablets, per case - - \$3.15 chasers. If a sulphurized-fat base is added to a straight mineral oil, the anti-weld ingredients are not sufficient to minimize the accumulation of

the addition of a definite type of chlorinated-base to a straight mineral of results in greatly improved performance.

TABLE VII

Effectiveness of Various Types of Oils of Same Viscosity

Threading SAE 1020 Bar Stock (122 BHN)

| Type of Oil | Tool Life | Fin:sh | Chaser Wear Per Min. |
|---|-----------|--------|-------------------------|
| Sulphurized- Mineral Oil | 50 Min. | 3.0 | .0010" |
| Sulphurized- Mineral Oil and Sulphurized-Fat | 79 Min. | 6.7 | .0003" |
| Straight- Mineral Oil and Sulphurized-Fat | 20 Min. | 1.0 | .0004" |
| Sulphurized- Mineral Oil and Chlorinated-Base | 72 Min. | 5.1 | . 0008" |
| Sulphurized- Mineral Oil and No. 1 Chlorinated- Sulphurized-Base | 74 Min. | 2.4 | .0006" |
| Sulphurized- Mineral Oil and No. 2 Chlorinated- Sulphurized-Base | 48 Min. | 2.0 | . 0007" |
| Straight- Mineral Oil and No. 1 Chlorinated- Sulphurized-Base | 86 Min. | 5.9 | .0003" |
| Straight- Mineral Oil and No. 2 Chlorinated- Sulphurized-Base | 82 Min. | 3.1 | .0006" |

build-up and to keep the built-up edge mobile and thus will result in low tool life, poor finish, and excessive chaser wear as illustrated in Table VII. The addition of a sulphurized-fat, however, to a sulphurized-mineral oil, or

Threading 2-In Seamless Steel Tubing

Seamless tub ing may have approximately the same composition and hardnes as SAE 1020 h stock; neverthe less the thread ing of this mate rial presents quite a different problem due to the difficulty of dissipating the heat that is developed In the case of bar stock, much of this heat is conducted away by the stock itself. whereas the relatively thin wall of the tubing is incapable of carrying off the same amount of heat in the same interval of time

It is generally found, therefore, that oils which perform well in the threading of SAE 1020 bar stock render poor performance in

the threading of seamless tubing of similar composition. And, conversely, an oil that performs poorly on SAE 1020 bar stock may be an excellent oil for threading seamless tubing, as shown in Table VIII. This type of oil Capacity Capacity Capacity Length of
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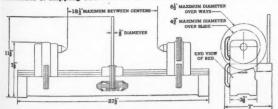
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SPECIFICATIONS

| Capacity — Maximum distance between centers181 | 12" |
|--|-----|
| Capacity — Diameter of work over ways | /2" |
| Capacity - Diameter of work over indicator slide43 | 4" |
| Length of bed | 12" |
| Net weight53 | 38. |
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that does the best threading job is probably a sulphurized-mineral oil containing a chlorinated-sulphurized base. The exception extreme-pressure, anti-weld and lubricity ingredients of this type of oil are necessary in order to minimize the development of frictional heat and thus keep the

job running &

cool as possible.
The same type

of oil is even more necessary in threading pipe. where the metal is almost never uniform in roundness, composition. and hardness. In this connection it should be observed that the best pipe threading oils are black oils, and are not transparent. A comparison between a first-class transparent pipethreading oil and a first-class black pipe-threading oil is also given in Table VIII.

Conclusion

Although this discussion has necessarily been limited in scope, it has been possible, I believe, to bring out certain points; to-wit:

- (a) Corrosive oils are more efficient than non-corrosive oils;
- (b) Threading operations require

TABLE VIII

Effectiveness of Various Types of Oils of Same Viscosity

Threading 2-in. Seamless Tubing

(Approx. same composition as SAE 1020—128 BHN)

| Type of Oil | Tool Life | Finish | Chaser Wear Per Min. |
|---|-----------|--------|-------------------------|
| Sulphurized- Mineral Oil | 30 Min. | 2.8 | .0025" |
| Sulphurized- Mineral Oil and Sulphurized-Fat | _ | _ | _ |
| Straight- Mineral Oil and Sulphurized-Fat | | _ | _ |
| Sulphurized- Mineral Oil and Chlorinated-Base | 47 Min. | 3.0 | .0007" |
| Sulphurized- Mineral Oil and No. 1 Chlorinated- Sulphurized-Base | 32 Min. | 2.4 | .0012" |
| Sulphurized- Mineral Oil and No. 2 Chlorinated- Sulphurized-Base | 68 Min. | 4.4 | .0017" |
| Straight- Mineral Oil and No. 1 Chlorinated- Sulphurized-Base | 14 Min. | 2.3 | .0028" |
| Straight- Mineral Oil and No. 2 Chlorinated- Sulphurized-Base | 12 Min. | 2.4 | .0026" |
| Transparent Pipe- Threading Oil | 44 Min. | 3.0 | .0011" |
| Non-Transparent Black Pipe- Threading Oil | 68 Min. | 4.4 | .0017" |





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a certain amount of lubricity, especially when cutting pressures are high;

- (c) The threading of draggy stocks requires a considerable amount of free, active sulphur, or chlorinated sulphurized base, while the presence of such ingredients in oils used for the threading of semi-brittle stocks may be detrimental;
- (d) There is doubtless an optimum viscosity for every machining operation on every type of metal;
 - (e) The threading of seamless

tubing and pipe requires a different type of oil than the threading of bar stocks; moreover, a non-transparent black oil seems to be more efficient for pipe threading than a lightercolored transparent oil.

It is understood, of course, that the cutting oil is only one of the factors that influence tool life and surface finish. Other factors, such as type of tool, cutting angles, and so on, are equally important. Moreover, the magnitude and mobility of the built-up edge are not the only considerations involved in the machining of

TABLE IX

Effect of Various Types of Oil of Same Viscosity

Threading SAE 3140 Bar Stock (279 BHN) SAE 1020 Bar Stock (122 BHN) 2-In. Seamless Tubing (128 BHN)

| Type of Oil | 3140 279 BHN | Tool Lif 1020 122 BHN | e Tubing 128 BHN | 3140 279 BHN | Finish 1020 122 BHN | Tubing 128 BHN | 3140 279 BHN | haser We 1020 122 BHN | Tubing |
|-----------------------------|-----------------|-----------------------------|------------------------|-----------------|---------------------------|-------------------|-----------------|-----------------------------|--------|
| S M O | 80 | 50 | 30 | 2.3 | 3.0 | 2.8 | 1.7 | 1.0 | 2.5 |
| S M O and S F B | 50 | 79 | _ | 2.1 | 6.7 | | 2.5 | 0.3 | _ |
| M O and S F B | 90 | 20 | _ | 4.3 | 1.0 | _ | 1.5 | 0.4 | _ |
| S M O and C B | 46 | 72 | 47 | 2.0 | 5.1 | 3.0 | 3.2 | 0.8 | 0.7 |
| S M O and No. 1 C S B | 41 | 74 | 32 | 1.2 | 2.4 | 2.4 | 2.0 | 0.6 | 1.2 |
| S M O and No. 2 C S B | 50 | 48 | 68 | 1.6 | 2.0 | 4.4 | 2.6 | 0.7 | 1.7 |
| M O and No. 1 C S B | 87 | 86 | 14 | 4.0 | 5.9 | 2.3 | 1.1 | 0.3 | 2.8 |
| M O and No. 2 C S B | 82 | 82 | 12 | 4.5 | 3.1 | 2.4 | 1.8 | 0.6 | 2.6 |

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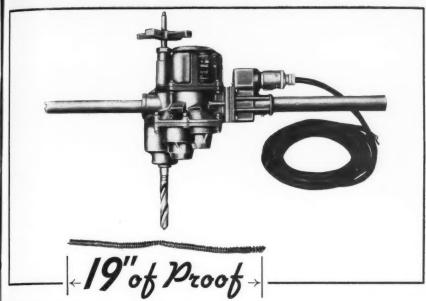
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metals and in the selection of cutting Cutting speeds, depths of cut, rates of speed, tool design, type and condition of metal, and other factors have equally important influence.

This paper has been presented, however, in the hope that some of the suggestions offered may throw some light on the metal-cutting problem and aid in eliminating the selection of cutting oils by the "hit-andmiss" method.

DISCUSSION

Q. You say that apparently the soft steel would tend to give you better tool life. On threading the same size shafts to the same speeds, would the chaser last longer on the soft steel or on the hardened steel?

A. It depends on a lot of conditions. On the soft steel the tool wear might be very much less, but your finish might go off in no time because of the sloughing action. After the finish is gone you have to take the tool out. Whether it is due to wear or built-up edge, it does not make any difference. As a rule on the 1020, in order to be sure that the build-up is sloughing off with the chip, you have to give it a steeper rake, and you make it easier to slide down the lip as compared with the 3140.

Q. Does the hammer action wear the lip of the cutter?

A. The rubbing action of the chip wears the lip of the chaser, and the hammer or pounding action deflects the chaser so that the ridges rub against the work and thus develop wear.

Q. Have you ever experimented with a slightly concave grind on the lip of the chaser?

A. No, we never have. It is done, however, satisfactorily.

Q. On concave grinding of the tap,

don't you find that you load up the tap faster than otherwise?

A. There is always that possibility, especially in threading dragg metals.

Q. When do you stop the test? How do you determine tool life?

A. It is a visual indication. You start cutting a thread and get a certain finish at the start of the cut The length of time you are able to hold that finish is the tool life.

Q. Do you stop frequently on these tests? Running at 25 feet per minute it is not possible to see when the finish breaks down.

A. No, but you take the first bar and run it through and then examine Take the next bar and run it it. through. Finally, an inspection of bar that has just been threaded shows that the finish has broken The time elapsed until the breakdown is regarded as the tool life.

Q. With sulphurized - mineral oil the power reading would naturally be less than with the straight paraffin

A. We would expect the meter reading to be less, but sometimes where we expected it to be lower it was not. There might be some difference in uniformity of material. We made every effort to get the material as uniform as possible. It was treated especially for us by the steel We specified the grain company. size, and so on.

Q. Do you also control the amount of sulphur impurities in the steel?

A. Yes, as nearly as humanly possible. We took a sample of every lot that came in.

Q. Has there been any relation in the high sulphur content of cutting oils to some studies made a few years ago on sulphur oils used as gear and bearing lubricants where, in the high

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Name. Address City_ State. addition of sulphur, they found that welding was prevented but at the same time an enormous amount of abrasion occurred?

A. Yes, but only to a certain extent.

Q. Have any studies been made on different cutting oils as to their actual ability to carry load?

A. Not any planned study that I know of.

Q. Shouldn't it be done?

A. Tests of the extreme-pressure characteristics of a cutting oil are merely indications of its ability to sustain extremely heavy loads without welding.

Q. There has always been in my mind a relation that could be established as to the value of an oil as a cutting lubricant, namely, its ability to carry a load.

A. Yes, there is a relation there, but that is not the only answer in relation to cutting oils. There are the equally important properties of viscosity and lubricity.

Q. Would you make any distinction between films that lubricate and films that prevent the solubility of one metal into another?

A. There is a very distinct difference. When you have a condition where you want to prevent welding, you don't lubricate; you merely contaminate those surfaces with something that prevents that welding. Dirty them up with sulphur. When you have to lubricate, it is not a question of dirtying the surfaces. It is a question of making them slipperier.

Q. What is the effect of carbon tetrachloride as an anti-weld?

A. It is undoubtedly the chlorine in carbon tetrachloride that does the trick. But it does not stay "put." Properly made chlorinated oils, on the other hand, can run week after week. And if you then take a sample,

you find that you have not lost enough chlorine to put in your eye. They are not as volatile as carbontet.

Q. Does that data necessarily apply to drilling a hole and then tapping it with a chlorinated oil?

A. The same reasoning would apply, but bear in mind the tapping job is very much more difficult than a threading job. There is very little opportunity for the cutting oil to reach the tap, and there is very little chance to cool the tap. Usually a different type of chlorinated oil is required.

Q. I am interested in getting the best oil. What about 18 PT for threading?

A. 18 PT has no chlorine in it whatsoever. It is a good pipe-threading oil, but probably would not be as good as a suitable chlorinated oil.

Q. The conditions of operation govern your selection?

A. Absolutely. The type of metal you are working with, the speeds you are working with, the tool settings, the cutting angles, rate of feed, depth of cut, and other factors.

Q. How do fatty material affect cutting oils?

A. Sulphurized-fat bases as a rule are more potent than free fat. Sometimes, however, you get better results by the addition of some free fat. It might be an animal oil, or it might be a vegetable oil. Some vegetable oils are quite effective, and some gum up the machines and tie up a department while you are cleaning them.

Q. Does the lay of the fibers in the tubing affect the pipe-threading problem?

A. It undoubtedly does. Also, the lack of uniformity in composition, roundness, and hardness of the material. From the experience we have had, and from the testing we have

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done, we have not yet found a transparent pipe-threading oil that is equivalent to a black non-transparent threading oil.

Q. Is there any sulphur in the transparent oil?

A. Yes, sulphur and chlorine in both of them. I think the amounts were substantially equal but I am not quite sure.

Q. Would a high finish on the chaser add anything as against just ordinary tool-room methods of grinding?

A. Yes. It is always desirable to "stone" the lip of a chaser, and some researchers go to the trouble of chromium-plating the lip to get an absolutely comparable performance.

Q. How does the composition of the tools affect tool life and finish?

A. We used only standard 18-4-1 Landis chasers, ground on a Landis grinder, with suitable jigs to make sure of maintaining the same cutting angles. We used the same type of tool all the way through, and made no comparisons with other types.

Addition to Elastic Stop Nut Plant

To meet the increased demand for its line of self-locking nuts, the Elastic Stop Nut Corporation, Union, N. J., has doubled its floor space. The original building, erected in 1940 by the Austin Company, has attracted considerable attention by virtue of the fact

that all of its steel construction is fastened with bolts and "Elastic" Stop Nuts instead of rivets.

Emergency Training Literature Available Through A.S.T.E.

Availability of literature for use in emergency training of defense worken for a wide variety of occupations is announced by the Emergency Defense Training Committee of the American Society of Tool Engineers, headed by O. W. Winter. The bulk of this literature is made available at cost through the co-operation of the Bureau of Industrial and Technical Education for the State of New York and coven courses in teaching the following subjects: heat treatment, job series, measurements, drill press, bench work, bluprint reading, lathe operation, and shop mathematics.

All of the above courses are available now. Milling machine and shaper of eration courses will be available July 1

A Technical Advisory Committee of the Society is being set up at the present time, the purpose of which will be to review and pass on and compile further instructional data on the subject of tool designing and tool engineering for use in defense and industrial educational work. Industry is already being scoured for favorable literature on the subject which is badly needed for emergency training courses.

Jefferson Type B Tool Post Turned and No. 5 Tailstock Turnet are covered in an illustrated and descriptive circular now being issued by the Jefferson Machine Tool Co., 750 W. Fourth St., Circinnati, Ohio. Copy free upon request



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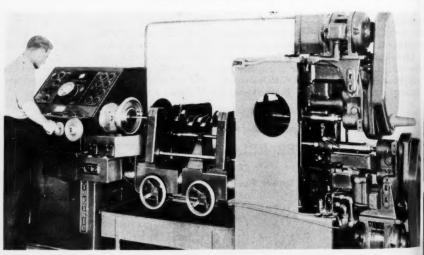
NE of the newest developments in the automobile industry's constant study of the problems of motor vibration and efficiency is a new radio balancing device which, developed by the Gisholt Machine Company, Madison, Wisconsin, is used in the Nash motor plant for balancing Nash crankshaft assemblies. The assembly, which consists of a crankshaft and flywheel, is positioned in the balancer and rotated, during which operation the balancer tunes in the most minute vibration, ferrets out the point of unbalance which causes the vibration, and indicates the amount of metal that must be re-

moved in order to correct the unbalanced condition. The metal is drilled out without removing the assembly from the machine. modern bile tro

A de

The relation of balance to vibration and the importance of having heavy rotating bodies such as flywheels properly balanced have been recognized since the early days of the steam engine. The method employed to balance the steam engine flywheel consisted of inserting a short shaft through the hub and then resting the shaft, horizontally, with both ends on parallels. The heavy side of the flywheel would naturally gravitate toward the bottom and when the heavy

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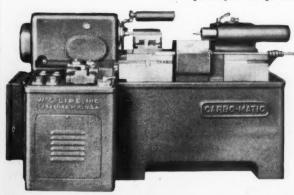
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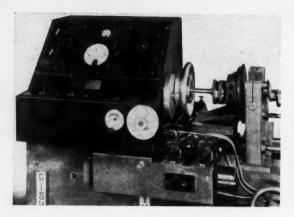
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Control Cabinet for Gisholt Dy netric Type U Balancing Machine

point was found, the operator plastered a lump of wet clay to the opposite side of the rim until the heavy spot was evenly balanced. The clay was then weighed and an equal weight of metal was drilled from the heavy side of the rim.

With the introduction of the multiple-cylinder internal combustion engine, however, it was discovered that points of unbalance could exist in several planes in the heavy "throws" of the crankshaft as well as in the flywheel, all of which contributed to setting up vibrations which increased in direct proportion to the increase in the speed of the engine. When speeds of automobile engines were increased to the present-day 3,000 to 4,000

r.p.m., the problem became acute. However, through the use of worksupports to which are attached coils that operate in the fields of powerful magnets, Gisholt engineers have been able to devise a mechanism with which both the points and amount

of unbalance can be determined in a few seconds. Once these factors have been determined, correction is a simple matter.

The unit of unbalance measurement is the "ounce-inch," which is the unbalance effect produced by a weight of one ounce at a distance of one inch from the axis in a rotating body. The centrifugal force exerted by unbalance and the importance of correct balancing of rotating parts is illustrated by the chart. From this illustration it will be seen that an unbalance of 1 ounce-inch develops a force of 1.15 ounces at a speed of 200 r.p.m., but when the speed is increased to 3,500 r.p.m., the unbalance of 1 ounce-inch produces a force of

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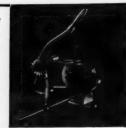
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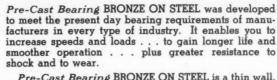
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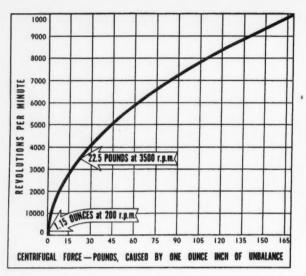


Chart Showing Increase in Centrifugal Force Exerted by Unbalance with Increase in Rev. Per Minute

 $22\frac{1}{2}$ pounds. With a speed increase of 25 times, the force produced by an unbalance of 1 ounce-inch increases more than 600 times. It is obvious that the momentum of a $22\frac{1}{2}$ -pound weight whipping around at a speed of 3,500 r.p.m. must set up a terrific vibration, therefore this unbalance must be eliminated in order to have a smooth-running motor and vibrationless car.

To balance a crankshaft assembly, the assembly is placed in the ma-

chine in a horizontal position with the end journals resting in two half bearings which carry the work on the same bearing surfaces used in the engine. These half-bearings are supported in a light aluminum structure which is suspended from wires. The use of a light weight, flexible supporting structure permits the work to vibrate freely if any unbalance exists, and with maximum amplitude.

With the workpiece rotating in the machine, any unbalance in the work will cause vibration of the support-

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ciple as a radio. Here the generated voltages are amplified as much as 1,600,000 times, the amplified voltage being indicated on a sensitive meter. Vibrations as small as 0.000025 in. will be reflected in the reading on the meter.

The angular location of the point of unbalance is determined by the use of a stroboglow lamp which flashes for ten millionths of a second each time the voltage generated in the pick-up coils changes from negative to positive. The flashing of the lamp at each revolution of the workpiece will cause one point on the periphery to apparently stand still. If numerals are placed on the periphery of the workpiece, the numeral which apparently stands still in front of the lamp will indicate the angular location of the point of unbalance. It is then a simple matter to drill out as much metal as may be required to equalize the balance.

The operation of drilling out the required amount of metal is performed in the balancing machine, a horizontal drill spindle with motor drive forming a part of the machine The spindle is so arranged that, with a drill of a given size, a hole can be drilled at a given distance from the axis of the workpiece which will, for a given depth, correspond to a given weight of metal. Thus the assembly can be balanced, the points of unbalance determined, and the unbalance corrected within a minute or so and without removing the assembly from the machine.

"For Dependable Protection of Plant and Property" is the title of a six-page folder announced by the Detex Watch-clock Corp., Dept. M-6, 76 Varick St. New York, N. Y., describing and illustrating the Detex Newman—a portable watch clock. Copy free upon request.

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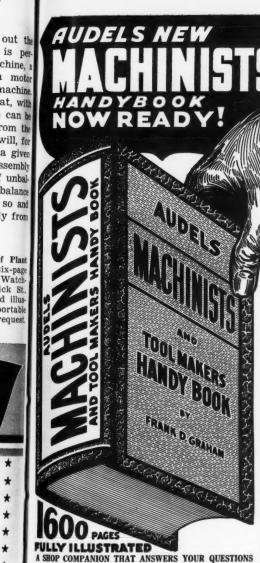
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Your Industrial Fort

Are You Using It in the Defense of Your Country?

MACHINE tools are as important as guns. In fact, without machine tools there would be no guns of the type that we know today. But we must build guns as good or better than those which may sooner or later be used by the enemy to threaten our shores, so every available machine tool must be used in the manufacture of defense materials—not only guns, but ships, tanks, airplanes, and other modern fighting equipment.

Approximately 2,500 government purchasing agencies are purchasing some 300,000 different types of articles for defense. The magnitude of the government purchasing set-up, especially under the rushed conditions of the moment, tends to confuse many manufacturers who are anxious to co-operate 100 per cent. Actually, government purchases are made on a very simple formula. Uncle Sam has an extremely simple system of purchasing supplies, equipment, and services.

How can a manufacturer make the proper contact with his government?

Any manufacturer who desires to co-operate with the government in the present emergency, and lacks specific information as to how to proceed, is invited to write to the Service and Information Office, Room Department of Commerce, Washington, D. C. This office is staffed with men who have had years of service in government and who will give every person who writes to them clear and adequate instructions as to how to proceed.

Many manufacturers have had the

idea that if they wish the transact business with the government they must either go to Washington or employ somebody familiar with government purchasing methods. The Service

and Information Office strongly urges manufacturers not to come to Washington, at least not until then are requested to do so, and they are advised not to employ outsiders on commercial or other basis. The War and Navy Departments and the 05 fice of Production Management emphasize the point that no middlemen or third parties are necessary to transact business with these departments. If it becomes necessary for a manufacturer to go to Washington the Service and Information Office will gladly make all necessary as rangements for the business man to see the particular official with whom contact is to be made. Thus the business man will be able to transact his business in Washington with a min mum of time, effort and expense, and return home with a clear understand ing of the procedure to be followed

Ideal Products Catalog. Published by Ideal Commutator Dresser Co., 10 Park Ave., Sycamore, Ill., this 24-pa illustrated catalog covers, in turn, Ida Flashlight Storage Batteries, "Univer sal" and "Thin-Line" Electric Etchen "Quick Heat" Soldering Irons, "Instan Heat" Solderers, "Silent" Commercia Cleaners, Water Pickup Cleaners, Direct Drive and Shop Model Undercutters. Carbon Brush Concavers, Coil Winder Drives, Insulation Formers, Armature and Stator Holders, A.C. Arc Welders "Hot Blade" Wire Strippers, Electric Wire Brazers, BX Armor Cutters "Handy" Fish Tape Reels, "Screw-Tite" Lugs, Cable Connectors, Lamp Changers, Switch Box Supports, Var-able Speed Pulleys, Live Centers, Grind ing Wheel Dressers, and so on. Copp free upon request.

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This manufacturer of naval and aircraft navigation instruments was getting behind the 8-ball on Defense production. Present tools were of universal electric type—slow in speed and in the repair shop too much of the time. I steered them straight along the following course:

(1) I tested their air pressure. It was too low for proper results if Air tools were added.

(2) I brought in a portable frequency converter and demonstrated a High-Cycle Grinder. Showed them how to make the sparks really fly!

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(3) Got out my pencil and did a little figuring. Twelve Air tools under their conditions would have required a compressor costing \$2475. A generator set for twelve High-Cycle tools would cost only \$1006. And power costs for High-Cycle would be 1/4 as much as for Air.

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Properties of Metals, IV

Age Hardening—Suppressed Transformations—Relation of Alloying Elements to Hardenability—Grain Size

> By AUSTEN J. SMITH Research Metallurgist, Lunkenheimer Company

IN the first article of this series the general properties of pure metals and solid solution alloys were discussed. In the two succeeding articles the effect of alloying elements on the constitution of pure metals was discussed and certain effects of the alloying elements on the properties of the pure metals under equilibrium conditions were touched upon.

Many of the alloys of commerce are used under essentially equilibrium conditions. Among these are most of the brasses and bronzes, the soft solders and bearing metals, many of the nickel alloys, and so on. Their general structure, as well as many of their properties, may be determined from their equilibrium diagrams. Knowledge of the phase relationships, therefore, becomes very useful in dealing with alloys of this

The changes that take place in alloy systems as a result of thermal treatment in accordance with the equilibrium diagram are normally quite slow. Just as recrystallization temperatures follow melting points reasonably closely, so the temperatures at which reactions take place in the solid state follow, in general, the order of the melting points. In the steels or in the copper-nickel alloys, the temperatures at which the lattice becomes sufficiently loosened to permit migration of the foreign atoms is quite high; in certain all minum alloys the reactions take place at room temperature; in the alloys rich in lead, below room temperature.

The reactions do not start imme diately, do not proceed at constant velocity when once started, and do not end sharply. A certain amount of time is required for initiation of the reaction, but once started it goes on with increasing velocity, attaining a maximum when perhaps 50 per cent of the original alloy has made the change. The velocity then drops off, proceeding at an increasingly slower rate as time elapses.

The general type of curve which will be obtained, if measurements of reaction are taken, is shown in Fig. 1. In plotting curves of this type the time scale is usually plotted logarithmically; that is, the time intervals instead of being uniformly spaced are successively increased by powers By this device the shape of the curve is not materially changed but tremendously long time intervals can readily be plotted on the same graph as short time intervals.

To the mathematically inclined, the curve of Fig. 1 is sufficiently regular

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Fig. 1—Chart Showing Course of Decomposition Reaction at Constant Temperature

as to suggest that a fairly simple equation could be set up covering the conditions. Unfortunately, this is seldom possible, due to the fact that the curve is influenced by many factors which may not be evaluated with any degree of certainty, such as purity of sample, temperature conditions degrees of attractions.

tions, degree of stress existing in sample, and so on. Curves of this type are, however, sufficiently regular so that comparison may be made between different curves when measured under essentially the same conditions. Extensive use is made of curves of this sort in the metallurgical investigation of the effects of heattreatment on alloys.

Age Hardening

The simplest case of reaction of the type above mentioned is that in which a metal dissolves less of an alloying element at

low temperature than at high. A typical case is found in alloys of silver and copper. The general equilibrium diagram for this system was given in Fig. 1 of the second article. In Fig. 2 herewith a magnified section of the silverrich portion of the diagram is Silver given. dissolves 8.8 per cent copper at

the eutectic temperature of 1425 deg. F. At room temperature, however, the solubility becomes almost vanishingly small, being only 0.3 per cent at 400 deg. F. Therefore an alloy of, say, 7.5 per cent copper, heated for a sufficient time at a temperature in the neighborhood of 1400 deg. F.,

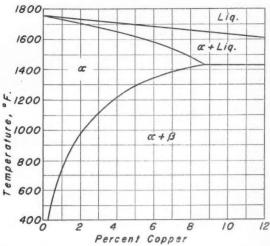


Fig. 2—Chart of Silver-Rich End of Silver-Copper System Including Sterling Silver Composition of 7.5% Copper— 92.5% Silver

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would show only a single homogeneous phase.

If this homogeneous alloy is now very slowly cooled to room temperature the copper will almost completely separate out, resulting in a two-phased alloy of nearly pure silver with 7.5 per cent of nearly pure copper. We are dealing here with equilibrium conditions strictly as shown in the constitutional diagram. In normal heat-treatments non-equilibrium conditions usually exist, however, for the reason that the temperature changes are too rapid to permit the different atoms to find their equilibrium positions.

If the full solution alloy at 1400 deg. F. is quenched to room temperature in brine, water, or other rapid cooling medium, the silver lattice at once becomes too rigid to permit migration of any of the copper atoms and they will remain mechanically

entrapped in their original positions. The alloy thus retains almost the same properties that it possessed at the quenching temperature.

If the temperature of the quenched alloy is raised to a point where the silver lattice becomes sufficiently loosened to permit migration of the copper atoms, these atoms will escape from the silver lattice and form a new crystalline phase of their own in accordance with the equilibrium diagram, only that portion of the copper remaining dissolved which appears on the solubility line of the diagram at the annealing temperature.

The temperature at which this separation can take place may be quite low, definite reaction having been shown to take place at 400 deg. F. At this low temperature the time required for the reaction to become even detectable is very long, but with higher temperatures the time be-

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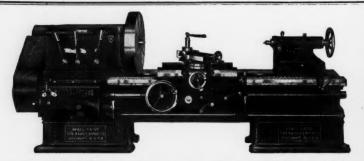
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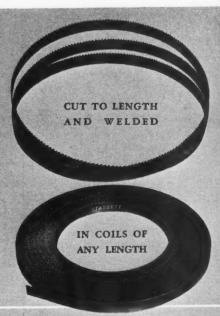
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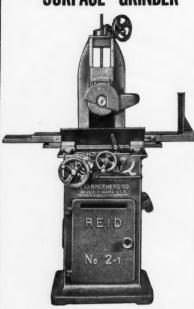
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comes progressively shorter. progress of reaction on annealing to quenched material follows a cur identical with that shown in Fig.

The precipitating copper atoms at first thrown out of the supersat rated silver lattice in almost atom dispersion. A new phase cannot definitely identified until a sufficient number of copper atoms are presen to form at least a unit cell. Further precipitation will result in the built ing up of the unit cell with newly m jected atoms.

As the first atoms are precipitate they will line themselves up on pro ferred planes of the silver latticethe line of least resistance-and a new atoms are added to this nucleu they will force some of the silve atoms out of their regular position disrupting the positions of all of the near surrounding atoms. This di rupting of the silver lattice plane will produce very much the same el fect as that produced by cold work ing as described in the first article of this series; that is, the planes wil not glide as easily over one anothe and increased strength and hardness are found at the expense of ductility

An added factor in this strength ening is the action of keying by the precipitate particles of the planes slip. How much of the strengthen ing is caused by distortion and how much by keying has not as yet been determined.

It is evident that as growth of the particles of the new phase continues the particles will attain a size to large to serve any longer as keys of slip planes and the migrating atoms will have left their original locations far behind, leaving large blocks of silver atoms comparatively undistorted. The strength will be found to have dropped to that of the normal two-phased alloy such as is obStraig easier Hydra clusiv kind that t up to a tou strok by eit Ini

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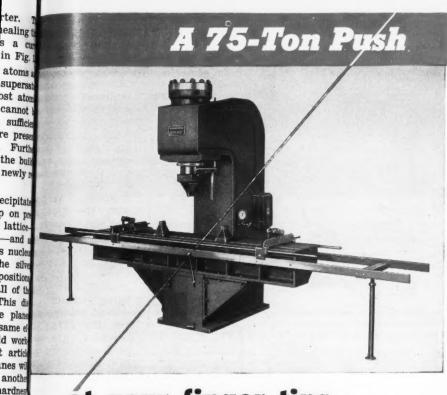
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finger tips

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noris obtained by slow cooling from the same temperature as used in quenching. In the course of reaction, when softening commences to appear, "overaging" is said to take place.

The whole sequence of reaction quenching an alloy from a saturat condition at an elevated temperature to a super-saturated condition at lower temperature, and subsequent

allowing the supe saturated atoms precipitate at the and constru low temperature, shown diagramma ically in Fig. 3. certain amount time is require for the reaction commence, varyin with the type material. Agin then proceeds rap idly up to a max mum hardness, at ter which it fall gradually as ove aging proceeds.

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That sterling si ver, the alloy our example, can be hardened by heat-treatment is fairly recent addi-

tion to our metallurgical knowledge and has been brought to light only by research on the general theory age-hardening. This is a case when science has preceded the art, even though sterling silver has been in use for several hundred years.

The diagram Fig. 2 may serve a

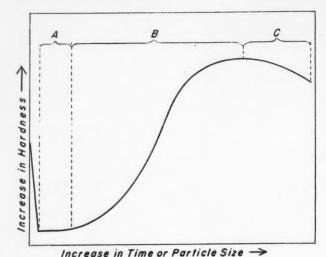


Fig. 3—General Course of Reaction in Age Hardening System, Showing Incubation Period, A; Aging Period, B; and Overaging, C

In most instances the first particles to precipitate, forming the hardening constituent, are too small to be detected by any of the means of investigation we have at our disposal. They are of little larger than atomic dimensions, are far too small to be seen under the microscope.



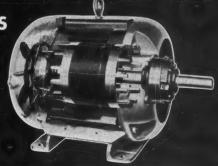
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GENERAL CONSTRUCTION.

The stators are practically unbreakable. They are constructed entirely of steel, together to obtain maximum strength with minimum weight. The end-plates are cast iron, accurately machined for perfect stator fit. Laboratory tests and extensive field experience have demonstrated conclusively that dust does not enter Wagner CP motors.



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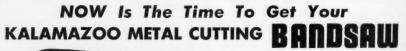
the prototype of age-hardening systems in general. The requirement is that there be a diminution of solubility with falling temperature. Diagrammatically this is illustrated in Fig. 2 by the line separating the alpha from the alpha plus beta field. This line is inclined toward lower concentrations with lowering temperatures. It does not matter whether the matrix is a primary or intermediate solid solution at the quenching temperature. Inspection of the different equilibrium diagrams will show that this condition is common, and if an alloy in a suitable system is quenched from the solution temperature and subsequently aged at the proper temperature for precipitation, a hardening action almost invariably will be noted.

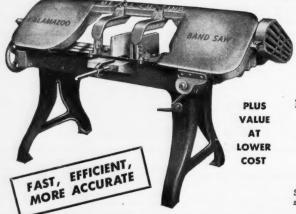
The temperature at which aging takes place varies with the alloy system. In duralumin-an alloy of alu-

minum with some 4 per cent copper, ½ per cent magnesium, ½ per cent silicon, ½ per cent manganese, and usually 1/2 per cent iron, the alloy is quenched in cold water from 930-950 deg. F. Hardening thereupon takes place at room temperature, about 48 hours being required for full hardening. This was the first alloy in which such hardening was noted, and, since hardening took place at room temperature after a period of time, the term "age-hardening" was applied. Although the number of cases where hardening takes place at room temperature are few, nevertheless the term is used for the general process regardless of the hardening temperature.

In many of the alloys, such as "S-Monel" or the beryllium-copper alloys, hardening takes place only at elevated temperatures. However, in some of the base metal alloys such

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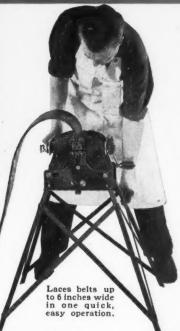
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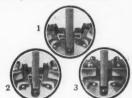


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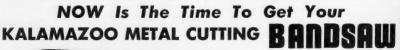
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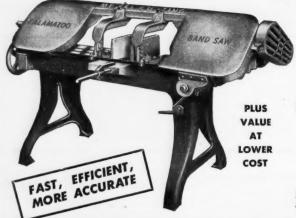
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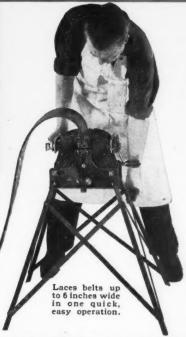
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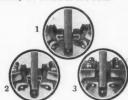
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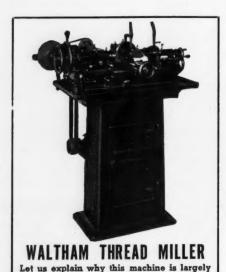
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as alloys of lead and antimony, aging and over-aging takes place at room temperature with the result that a stable hardness is not found as it is in duralumin or in the alloys aged at elevated temperatures. Nevertheless, such hardening may be useful, as in the case of lead cable sheathing. The hardening action is not permanent, necessitating a re-quenching of the material after being and while still in Fortunately the quenching service. temperature is low and this retreating is not difficult, while the increase in strength makes the process more than worth while.

In many alloys the hardening resulting from an aging process is only moderate. In certain alloys, on the other hand, it may be quite marked, the increase in Brinell hardness numbers amounting to more than 100 per cent in alloys such as beryllium-copper.



Suppressed Transformations

In much the same manner that the elevated - temperature solid - solution state of an alloy may be preserved at lower temperatures by quenching, so transformations that would normally take place with falling temperatures may be suppressed completely or retarded to such an extent that profound differences from the expected structure are found. This is true in some of the intermediate phases of non-ferrous alloys, but especially is it true for most of the members of the great family of iron alloys.

It was pointed out in the first article that pure iron shows a transformation at 1670 deg. F. from the gamma structure stable above this temperature to alpha stable below. By the addition of carbon this transformation is lowered to 1300 deg. F., the temperature at which the reaction is completed under equilibrium conditions. This change, with carbon additions, was discussed at some length in the third article, to which it may be well for the reader to refer at this time.

In pure iron, the lower carbon straight carbon steels, and many of the alloy steels, it is impossible to preserve the gamma form—austenite—at room temperature regardless of how drastic the quench. In the higher carbon steels and a number of the alloy steels some—or even all—of the austenite may be retained. When this retention is complete, a hardness or other physical test will reflect the characteristics of a face-centered cubic alloy; soft, ductile, and with but moderate strength.

With a low temperature aging, the breakdown of this retained austenite will be brought about following very much the same sort of curve as in the supersaturated solid solution type of hardening just described and the one m

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whole reaction will be quite similar, the important difference being that in the supersaturated solid solution type of aging there is little structural change in the matrix, only a slight volume change being noted, while in the "s u p p r e s s e d transformation" aging the matrix exhibits a complete change of structure.

In the straight carbon and most of the alloy steels, as noted above, it is impossible to secure complete or even partial retention of the austenite by quenching. It may be assumed that the reaction takes place so rapidly that complete aging takes place in the quenching bath. The physical tests on such a quenched steel will show very high hardness and tensile strength and almost negligible ductility and impact strength.

An examination of the causes of this very high hardening becomes fairly revealing. For example, a steel of eutectoid composition of say 0.85 per cent carbon-which on annealing would be wholly pearliticwould show all of the carbon in solid solution on being heated into the austenitic range. As indicated by the iron-carbon diagram, illustrated in the preceding article, gamma iron can dissolve as much as 1.7 per cent Alpha iron, however, can carbon. dissolve only a small fraction of this; 0.035 per cent maximum at the eutectoid temperature of 1300 deg. F.,

and approaching zero per cent room temperature.

The tendency of the iron atoms transform from the gamma to all form is so great that it cannot suppressed by quenching. 0.85 per cent carbon dissolved in eutectoid steel does not maintain mobility on quenching necessary it to escape from the iron latti and it remains mechanically trapped in a new lattice which has room whatsoever to accommodate Since the carbon atoms cannot be pelled, an extremely high distorti results in the iron lattice, somewh similar to that in an aged supersat rated solid solution lattice but ve much more intense. Hence, we fir that a very extreme hardness has n sulted, glass hard in the eutecto steel, which is practically of the steel composition.

Unfortunately, the stress impose by quenching to produce this state also very high and, impressed on it stress of distortion, makes the stevery brittle and nearly useless for commercial purposes. To relieve the stress—of both types—and restorated is tempered at moderate temperatures; the equivalent in the normal age-hardening systems of "over aging." The hardness is permitted the fall somewhat but with very conferable increase in toughness. In

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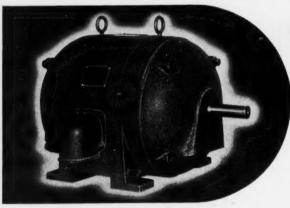
tool steels, since high hardness is a requisite, the hardness is permitted to fall only slightly and so such steels will still be rather sensitive to shock. In the other heat-treated steels, such as those used in spline shafts or gears, shock loading may be very important, but high hardness other than surface hardness is usually not necessary and the steel is considerably softened with a tempering at quite elevated temperatures.

The structure of high hardness, which is that wherein carbon atoms are entrapped in the alpha iron or ferrite lattice, is known as martensite. Its maximum hardness as measured on the Rockwell 'C' scale is about 66.

When martensite is reheated, the first development that occurs in the iron lattice is the expulsion of the carbon atoms. With different controlled heating temperatures a con-

siderable range of degree of expulsion can be attained. As in overaging, the first carbon atoms are rejected in approximately atomic dispersion. As diffusion is permitted the carbon atoms will associate with one another and with certain of the iron atoms until the stage is reached where an elementary cell of cementite, Fe,C, is formed, three iron atoms uniting with one carbon atom to form the compound. But this compound in itself possesses very high hardness. and the fall in hardness with more complete rejection of the carbon is gradual.

The end product of agglomeration is pearlite, similar to but not quite the same as the pearlite formed on annealing or normalizing since a granular rather than lamellar structure is found. The intermediate stages of carbide agglomeration have been given different names in the



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A Splash - Proof motor constructed to NEMA specifications now offered at the SAME PRICE as a standard open type motor.

A Complete line of Ball Bearing equipped Squirrel Cage Industrial Motors, built to NEMA specifications, from ½ to 75 H. P. In addition the above illustrated type RS Streamlined Splash-Proof, Semi-Enclosed motor now available at standard open motor prices. Write for data covering your requirements. PROMPT DELIVERIES.

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The No. 20 Cross is a Universal Milling Machine with a cutter spindle adjustable to any angle in any plane. Many features make it the ideal machine for a variety of work including: contour profiling, die sinking, angular milling, jig boring, routing of nonferrous materials, automatic milling, etc.

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past, the first product of the tempering operation being known as "troostite," the next stage as "sorbite."

Recently, with an increase in knowledge of transformation reactions, there has been a tendency to drop these terms when referring to tempered forms, "troostite" being reserved for a special type of transfor-

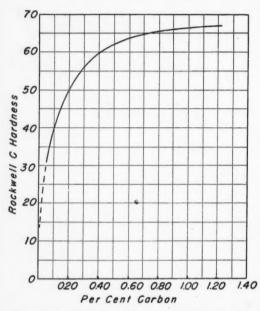


Fig. 4—Dependence of Hardness of Martensite on Carbon Contract (After Rain)

mation and "sorbite" being dropped completely. Sorbite is now recognized as a very fine pearlite structure, and in the opinion of many there is no longer a real need for the

With most of the alloying elements which dissolve in iron, the foreign atoms substitute directly for the iron atoms on the points of the iron lattice. When a carbon-free iron alloy is quenched from a range of high solubility to a range of low solubility,

the same type of lattice distorts will be found as in the super-sal rated solid-solution types that exhibit age-hardening, and the hardening attion will be quite similar.

Carbon, on the contrary, enters in to the interstices of the iron lattice that is, the gamma iron lattice, alpha iron, an iron atom is found.

the center of the body-center ed cubic lattice and there no longer room for a carbo atom to enter into this interestitial region. The distortion resulting from mechanical entrapping the carbon atom in their interstitial position thus becomes extreme—fingreater than that found with the substitutional type.

From the foregoing it shows be evident that the intrinsic hardness of martensite as fin formed, and most truly represented as the surface hardness of a quenched piece, shows follow the carbon content the steel rather closely. Fig. shows this dependence. To those familiar with hardness of quenched steel it will be seen that the maximum hardness attainable in an steel may be closely approached in a straight carbon graded.

Hardenability

The conclusions reached in the preceding paragraph may raise the question why, if the ultimate hardness obtainable in a straight carbon steel alloying elements are used at all. It was remarked earlier that in a plain carbon steel it is impossible to retain a completely austenitic structure quenching, due to the fast reaction. The reaction is so fast, in fact, that a drastic quench—water or brine—necessary to achieve even a marter sitic condition.

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FOOT CONTROL SOLENOID CONTROL

MECHANICAL CONTROL

ALL AIR CONTROL CONTROL As a large section naturally will cool more slowly than a small section, it becomes obvious that a section size will eventually be reached where the quench cannot be sufficiently rapid to produce a martensitic condition, regardless of the quenching medium. In the plain carbon steels this maximum section size that will completely harden will be found approximately in a one-inch round. Any larger section will be soft at the center.

The alloying elements serve the purpose of slowing down this reaction velocity. Their effectiveness in this respect depends on their concentration, but also certain elements are much more effective than others.

As a consequence of this retarding of the velocity of reaction, steels with proper amounts of alloying elements may be hardened in a less drastic quenching medium than water or brine, oil being generally used although often air-cooling is sufficiently rapid for the purpose. Since the cooling need not be so rapid as in a carbon steel, with an equivalent quench the alloy steel would be expected to harden to greater depth. A measurement of this increased depth of hardening is known as the hardenability of the steel.

Note that hardenability is not to be confused with hardness, for essential-

ly the same hardness will be four at the surface with equivalent carbo contents over a considerable range section sizes. The usual measurement of hardenability is the size or round which will just harden throughto the center. Many other measurements have been proposed, each with a certain merit but as yet lacking in general acceptance.

Grain Size

Besides the alloying element other factors enter into the feature of hardenability. Among these on of the most important is the size of the austenite grains just being quenching. As pointed out in the first article, there is a discontinuity of the lattice forces at a grain boundary and invariably reaction with commence at such a discontinuity.

If the grain size is fine, a largerain boundary surface will exist an reaction may go nearly to completion without the material lying we within the grain taking part. However, if the grain size is coarse without a small amount of grain boundary, the reaction cannot progres very far at the grain boundary alon As a consequence quite different reaction rates will be found between coarse and a fine-grained steel, the coarse-grained steel showing must greater hardenability because of the longer time required for reaction.

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UCCESS of the vast effort to attain national security is based directly on how swiftly manufacturers can produce . . . produce without any sacrifice of those standards of accuracy that have made mass production of interchangeable metal parts a distinct American accomplishment. Ex-Cell-O's place in the great emergency is obvious. As one of the nation's leading builders of machine tools, its high-precision products have for years contributed to the increasing of metal working efficiency . . today, practically every branch of modern industry depends upon them when accuracy, speed, economy are the requirements. The same superior skill and experience that made these Ex-Cell-O achievements possible in the past . . . that have made Ex-Cell-O a common word for precision wherever machine tools are used . . . are willingly pledged to the great task now placed upon them-to serve American industry to the ultimate degree of human power in the supreme job of protecting America.

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Unfortunately, while the coarsegrained steel shows greater hardenability, it is decidedly inferior to the fine-grained from the point of view of toughness, again because of the discontinuities at the grain boundaries. Hence, a further need for alloys is in the production of a deep hardening steel which will still have a fine grain size.

The peculiar advantage of a deep hardening steel is the attainment of a proper depth of hardening with a mild quench. Very high quenching stresses may be developed when using water or brine, sufficient at times to fracture the piece, particularly around a notch or other sharp angle. By use of a less drastic quench such as oil or air this high quenching stress is avoided largely, considerably lowering the danger of fracture and spoilage in the quenching bath. At the same time adequate depth of hardening is obtained.

The compositions and heat treatments of many steels have been well worked out and may be found in any handbook. From the foregoing remarks, however, it will be seen that we are demanding the utmost of the steels we have available. They have been developed to a high degree of perfection.

But even with this perfection our demands are such that they are decidedly not fool-proof. Hence, considerable care must be taken in their selection, their heat-treatment and their use. The heat-treatments given in the handbooks are suitable for the stated conditions. Seldom are these conditions completely met with and considerable judgment must be used when the conditions are departed A knowledge of the factors involved is necessary for proper judgment.

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Broaching practice, because of its importance in high production work, is developing faster than other phases of machining and faster, in fact, than its record is being written. Consequently, up-to-the-minute experience is vital to both speed and economy.

For instance, do you appreciate the savings in time and tool cost being made by the Red Ring Double Jump Broach (patented)?

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Are you lamiliar with what is being accomplished by Naloy tools in the field of hard gour broaching?

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Today's defense program demands the ultimate in speed, quality and economy. Where broaching or form tool cutting is under consideration, consult National Broach engineers for the last word in modern practice.

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limit. To make the best use of them a knowledge of their capabilities is essential. But on top of all of the uses comes the problem of fabrication. They must do the job cheaply and fabrication will invariably bear the brunt of the cost. In the end machining is tied up with properties and structure and the manufacturer is becoming more generally aware that a knowledge of structure and of the results of heat-treatment will aid materially in reducing costs.

It has been the intent of these articles to give an insight into the problems of the metallurgist and touch on the basic principles that will aid in the understanding of metallurgical literature. There is a fascination to the study of the nature of the materials with which we work and it was that fascination in the past which has led us into an "Age of Alloys."

A.S.A. Approves First Defense Emergency Standard

The American Standards Association has announced the approval of its first Emergency Defense Standard. The new standard, which is for the machine tool industry, sets up accuracy requirements for lathes.

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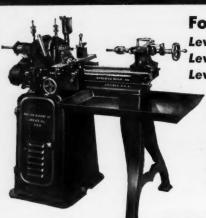
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The new lathe standard describes a series of tests to be applied for checking engine lathes in respect to such matters as bed level, tailstock way alignment, spindle center runout, lead screw alignment, and in turning the work cylindrical when mounted in the chuck or between centers. The accuracy requirements, stated in terms of maximum permissible variations, apply to three groups of engine lathes; toolroom lathes, engine lathes from 12 to 18 in. inclusive, and engine lathes from 20 to 36 in. inclusive.

"Accuracy of Engine Lathes" will be published at an early date by the American Standards Association in a distinctive format to identify it as a Defense Emergency Standard. Copies will be available through the American Standards Association, 29 W. 39th St.

New York, N. Y.

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Lever Operated Double Tool Posts Lever Operated Collet Attachment Lever Operated Tailstock

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FIG. 1.



FIG. 2.

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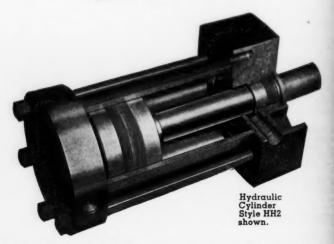
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Cylinders must be built not only to resist wear but to exert the maximum amount of power that a given bore cylinder operating at a given pressure per square inch—can theoretically exert. This gets all there is out of the compressed air or hydraulic pressure supplied.

To do this, T-J Cylinders use low friction factor leathers that at the same time provide an effective seal. T-J Air Cylinders when used at 80 lbs. pressure p.s.i. and T-J Hydraulic Cylinders when used at from 500 to 1500 lbs. pressure p.s.i. perform at an average mechanical efficiency of 95%.

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Blades



ONTROLLED and Uniform Blade Adjustment—When a McCrosky JACK-LOCK Cutter is ready to be resharpened, all blades can be adjusted uniformly by the individual adjusting screws—one behind such blade—and the amount of stock to be sacrificed in regrinding as be held to a minimum. That's one reason why JACK-LOCK lades last longer.

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SUPER ADJUSTABLE REAMERS

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ADJUSTABLE BLOCK BORING BARS SPECIAL PURPOSE TOOLS McCROSKY TURRET TOOL POSTS

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MODERN MACHINE SHOP

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Contour Gage for Gun Jacket

By J. R. WHITTLES

THE drawing presents the features of a contour gage which was used some time past to check the contour and dimensions of the jackets for 155 mm. guns. The jacket is a casting, and the inspectors check the contour of each jacket before it is removed from the lathe.

The gage fits to the casting at H and K, and the remaining part of the gage follows the contour of the casting with enough clearance between for the insertion of the feeler gage I. To the body of the gage A at F are riveted two flanged pieces F, which are used to square the gage against the shoulder H. At the front end is riveted a bearing B which holds the

knurled head screw D at the clamp.

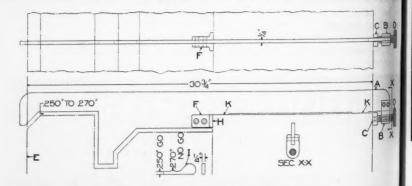
The gage A is made of steel in the feeler gage I is made of tool steel hardened and ground and made to a

hardened and ground and made to the fingers so that it can be use easily.

High Speed Blanking Operations

By C. C. HERMANN

THE electric toy trains made by harmonic Lionell Corporation, at Irvington New Jersey, are turned out in large quantities and some of the parts of made in very modern high speed muchines. Such a part is the lamination for a 12-volt transformer for a by train set, the design of which is shown in the drawing. This lamination is



Drawing of Contour Gage for Gun Jacket Inspection

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July, 1941 July, 19





In constant service 48 hours per week at the Gould & Eberhardt plant, Irvington, N. J.

Purchased by Gould & Eberhardt, Irvington, N. J., manufacturers of gear cutting machines and shapers, to speed up cutting off from bar stock on various grades of steel up to 6" in diameter, this MARVEL 6A high speed Production Saw has been operating 48 hours per week since installation over a year ago. When photographed it was automatically cutting identical lengths from "Maxwell" No. 31/2 hot rolled natural steel 25/8" diameter. The actual cutting time per piece, using a 6 tooth MARVEL High-Speed-Edge Hack Saw Blade, was I minute 15 seconds per piece.



THE HACK SAW PEOPLE

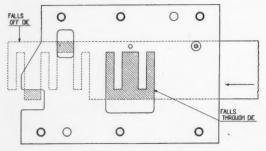
5700 Bloomingdale Ave. Chicago, U. S. A.

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made from electric steel 0.018 in. thick and $2\frac{\pi}{16}$ in. wide. The stock is purchased in 300-lb. rolls of suitable width.

The laminations are blanked out in

the diameter of the punch and die, this clearance is increased to 0.005 and as much as 0.006 in. in dies to be used in this press. And there are no fins on the blanks, and no coolant is used.



Die Layout for Transformer Lamination for Lionell Electric Train

a No. 3 Super Press, and are fed to the machine by an automatic feed mechanism. As will be seen from a study of the drawing, two laminations are produced at each stroke of the press, also the waste, when this method is used, is reduced to the absolute minimum. Practically the only waste is a rectangular piece ½ x 5% in. in size which is removed from the end of the center lamination tongue, and a piece of the same size removed from between each of the blanks.

To eliminate vibrations caused by the high speed of the machine, the machine is set on a reinforced concrete foundation 6 ft. wide by 8 ft. long by 6 ft. deep. When producing laminations as shown in the die layout above, the machine is operated at a speed of 450 strokes per minute, producing 900 laminations per minute. The use of the method shown here makes possible a greater clearance between the shear edges of the dies than could be obtained by the use of the former equipment. example, whereas 0.004 in. clearance was the standard allowance between

Welding Positioner Table

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In order to successfully compete in fabricating the wide variety of jobs that the small welding shop is called upon to do, the management must rely largely on ingenuity in place of capital

investment for special and sometimes intricate tooling.

The photograph shows a revolvingtilting welding positioner table that



Welding Positioner Built of Simple Materials at Cost of \$32.13 (Photo Courtesy Hobart Brothers Company)

can be built at a cost that will be within the possibilities of the most modest jobbing shop. This positioner

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instruction of the table consisted in esting a satisfactory and cheap chanism for the revolving member the table, and the answer was and in the suggestion that we use front axle and wheel assembly a discarded automobile truck. A to a graveyard of defunct autoobiles disclosed the fact that an limited supply of such wheel asmblies was available at \$1.50 each. With a wheel assembly as a basis design, it took but a short time develop a tilting and revolving potioner that could easily be rotated th a load up to 1,000 pounds. It s found that the following material as needed:

s built when it became necessary

improve welding procedure in the

brication of flanged pipe nozzles for

The most important problem in the

1 Steel Base Plate 1 x 34 in. dia. 1 Steel Table Top ½ x 36 in. dia. 1 Coil Spring of 1/8-in. wire 10 in.

1 Steel Yoke Plate 34 x 12 x 16 in.

ther parts were taken from scrap. Little description is required, the ain features being a pin which regters with holes in the yoke and, atrolled by a foot pedal, locates the ble at the required angle; a presne plate controlled by a spring rough levers to the foot pedal, givthe operator full control of the ork as required; clamps to hold the rk in position.

The cost of the completed posimer is as follows:

Material\$17.73 Productive labor

(16 hr. @ 90c).... 14.40

Total.....\$32.13

The positioner was ready for serv-

CHICAGO WHEELS OF V/T SUPER BOND

150% LONGER LIFE

V/T Super Bond is the most important development in mounted wheels in 30 years. Does work faster and better. Won't ridge on welds, sharp corners, sinking dies, barbering, etc.

TRIAL WHEEL—Tell us kind of job, type of equipment you use and size wheel and we'll send you one to try out.

FREE CHART — A Wall Chart 22 x 15" shows actual size and shape of every standard Chicago Mounted Wheel. Ask for one.



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For jobs beyond the capacity of the Handee, nothing compares with the HI-POWER in vibrationless performance, precision and stamina. 17,000 r.p.m. with ample power to drive a 2½" diam. wheel. Wt. 3 lbs. In wood case with accessories, \$35.00.

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Grinds, drills, polishes, cuts, routs, carves, sands, saws, sharpens, engraves, cleans, etc. Uses 300 accessories. 25,000 r.p.m. Wt. 12 oz. \$18.50 with 7 Accessories.

10 Days

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Send for catalog of complete line.

CHICAGO WHEEL & MFG. CO.

Makers of Quality Products for 40 Years 1101 W. Monroe St., Dept.MM, Chicago, Ill. ice within three days after the decision was made to build one. This same type of positioner is now being re-designed for use in the fabrication of an order for web-and-spoke wheels to be used in the Defense program.

rests on the fixture. The parts a finished to size from rough castin at a single traverse of the table, a the method is conducive to unifor ity because, once the milling cutte are properly set, the operation

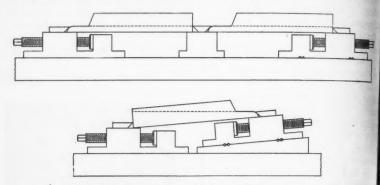


Fig. 1 (above) and 2 (below)—General Design of Fixture for Use in Machining
Driving Box Shoes and Wedges

Fixture for Driving Box Shoes and Wedges

By John H. Marchmont

THE holding fixture illustrated in the drawing, designed for use in the gang milling of shoes and wedges, permits working on five surfaces simultaneously. By this method all the surfaces of these parts are machined except the edge of the flange (which is not finished) and the face that duplicated exactly on all subsequents.

Figs. 1 and 2 show the general sign of the fixture, Fig. 1 show the set-up for milling two shoes a single traverse of the table. Fig shows the arrangement for milling driving box wedge, using the was shown in Fig. 3 to level the driving box wedge. Fig. 4 shows the delto of the gripping jaw, which is tip ened by screw action and operate a dovetailed slot in the block so



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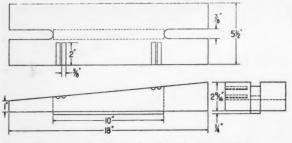


Fig. 3-Wedge Used to Level Driving Box Wedge

what like the jaw of a lathe chuck. This member has a base to which a rib is attached that can fit into the T-slot in the milling machine table

and thus align the device. The design also includes a work support, slotted to accommodate the adjustable jaw that grips the workpiece.

Details of the block that holds down the opposite end of the shoe are presented in Fig. 5. This block takes the thrust of the jaws (which balance each other as far as thrust is concerned) when

two shoes are milled in the fixture, as as shown in Fig. 1. In use, the device is bolted securely to the table and is backed up by stops at each end. The work is further supported by several small planer jacks or stud nuts between the work and the milling machine table.

Figure 3 shows details of the leveling wedge used as shown in Fig. 2 in connection with the milling opention on the back of a driving box wedge. The

several %-in. round holes serve keyways when pegs are inserted and thus prevent the jaw-supporting member from slipping back due to the

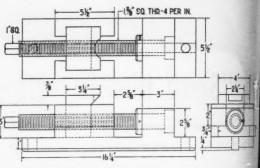
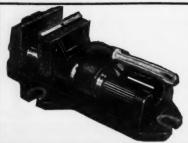


Fig. 4-Details of Gripping Jaw

thrust of the screw.

Gang milling is not so much of a time saver as it might seem when applied to steel or cast iron shoes



Quick-Acting PRESTO

Sliding jaw is moved up to work with lever in raised position. Lever is then pressed downward to exert desired pressure on part being clamped. To release, lever is raised which disengages clutch and slide moves away from Write for complete details. work.

D. A. SMITH & CO. DETROIT, MIC 8097 LIVERNOIS

MODERN MACHINE SHOP

July, 1941

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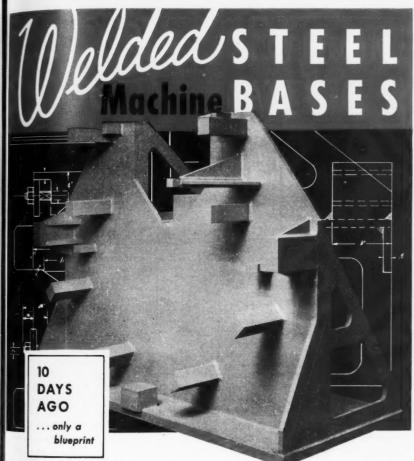
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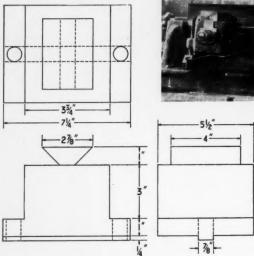
**The R.C.

Even in this reproduction from an unretouched photograph, the finer craftsmanship that goes into the production of a Mahon Welded Steel Machine Base is quickly apparent.

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Fig. 5 (Below — Drawing of Block That Holds Opposite End of Shoe

Fig. 6 (Right)—Fixture for Holding Shoes and Wedges in Draw Cut Shaper



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marks laid out by the erecting floor crew, and holds the work so securely that heavy cuts may be taken.

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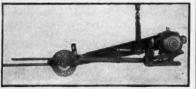
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The reader's attention is called to the double tooling used with the shaper fixture. One of the tools is a filleting tool. Note also the wedge arrangement at the right to brace the chuck against the machine-column. A small

handwheel at the left controls expanding lugs that are set out against the shoe or wedge flanges, thus taking the thrust of the chuck jaws and preventing distortion of the work.

and wedges, and these are often machined in the planer. To machine the box faces of shoes and wedges there is no better fixture for holding them than that shown in Fig. 6, which is designed for use with the draw cut shaper. This fixture permits leveling the parts quickly to the prick punch

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Jack Pin for Milling Fixture

By DONALD A. NEVIN

AN interesting article under the above title, by F. J. Wilhelm, appeared in the May issue of MODER MACHINE SHOP.

In the article the so-called old style fixture was illustrated in Fig. 1 and attention was directed to its understable height due to the design of the jack pin. An improved design, offers in Fig. 2, consists of a ball which it

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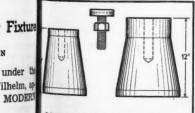
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MODERN MACHINE SHOP

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lifted by a set screw. This design provides for a lower fixture, it is true, but has the fault of elevating Thus it will be seen that the spin lifted support in Fig. 1 of Mr. W helm's article is superior because

spring need only strong enough to a vate the jack pin, which is then clamp solidly against thrust the milling cutter the set screw F being against the wed angle on one side the jack pin.

In Fig. 1 herewith shown a method which this desired feature can be embied without increasing the height of the fixth

Since the amount of movement the jack pin J need only be sufficited allow for the uneveness of the face of the work which it contains the coil spring H may be made me shorter than previously illustrated.

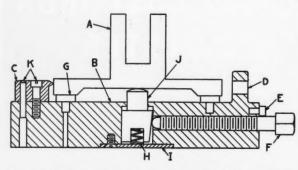


Fig. 1—Design of Milling Fixture Using Jack Pin to Support Light Part-Structure

the work $\bf A$ above the support $\bf I$ due to the ball $\bf J$ being raised to contact under work $\bf A$ by positive means, and experience has shown that this will frequently occur even though the clamp $\bf F$ is operated first.



LITTLEFORD BROS. 433 E. Pearl St., Cincinnati, Ohio

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July, 1





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say three or four times the amount of movement required; also it may be located inside of the jack pin J as shown.

screw F in the other design. Th flatted portion of K is also shape with a cam angle to elevate jack pi J due to the expansion of the co

Fig. 2—Design of Milling Fixture with Jack Pin, Recommended for Use with Light Work

Another design, shown in Fig. 2, is preferable where a light cut is to be taken. The jack pin J is slotted at the lower end to straddle a flatted plunger K which replaces the setspring H.

In operation h work is placed upo the supports I an the end of the plun ger K is press with the thumb un til the work clamped with clam G, then it is re leased. The wedge angle should not en ceed 15 degrees: a so, this design is no recommended for heavy duty or when

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there is considerable chatter. How ever, it does provide for rapid pr duction for finish cuts, especially where a quantity of jack pins at required for supporting the work,

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An exceptionally wide range of internal grinding jobs can be handled on the New Majestic Internal Grinder. Its simplicity of design and ease of operation are features of utmost importance in providing maximum grinding output at low cost.

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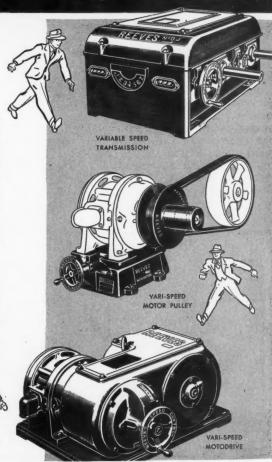
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which case the design should provide for simultaneous operation of same.

Simple Aids to Jig Boring

By R. RICHARDS England

WHEN boring holes in a jig plate or similar workpiece in the jig boring machine, it is usual to position the hole from the two closest edges of the plate. In most cases, of course, the edges are at exact right angles to each other. Difficulty arises in some cases, however, where it is necessary to measure accurately from the edge of the plate to the exact point of the hole location and it was to simplify this operation that the "aid" described here was devised.

The spindle of a jig boring or other vertical-spindle machine can be set

Straight Side

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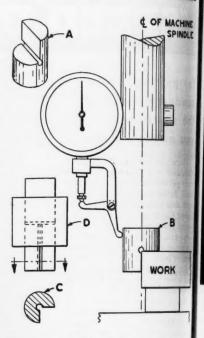
Write for new catalog illustrating and describing this and other presses.

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Newark, N. J.

accurately to a point a given distance from the edge of the workpiece if it can first be located over the exact edge. This setting can be obtained



Hardened and Ground Plugs, with Half or Quarter Sections Cut Away, Will Aid in Seting the Machine Spindle Over the Edge d the Workpiece

by the use of the cylindrical piex indicated at A, which can be any diameter but for convenience should be approximately 1 inch, and which has one side milled away to the exact center for approximately one-half the length of the piece.

When applied to the edge of the workpiece as shown at B, the central line of the plug is in exact alignment with the edge of the workpiece. By using a dial indicator clamped to the machine spindle, or to a bar in the machine spindle, locating the spindle in dead alignment with the edge of

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ap and Die Division-Winter Brothers Co., Wrentham, Mass.

the work is a simple matter.

At C is shown a drawing of a similar plug, except that instead of having one-half milled half away, onequarter of the plug is milled out so that the plug can be used at the corner of a square or rectangular plate. Half of the plug can be left round, or one-quarter can be milled out of the entire length of the plug, then a cylindrical plug can be used with it by making a slip-ring that will just take the two plugs as shown at D. If the ring is accurate and the plugs are a push fit in the ring, the device will serve the purpose.

Portable "Substation" for Power-Failure Emergencies

As "continuity-of-power insurance" the Cincinnati Gas and Electric Company has added to its equipment the 33/13.2-4.5-kv Westinghouse portable substation shown in the illustration. In the case of failure of a regular substation, the trailer unit can be speeded to the scene and plugged in to the power line, restoring power within a few mintes. The

four-wheel trailer carrying the mobile station can be towed on a highway at speeds up to 40 miles an hour

The heart of the portable substation is a compact transformer in which the core and coils are laid on their sides and cooled by forced-oil circulation. This transformer is an outgrowth of a unit developed several years ago to fit into a small space in an electric locomotive. The new portable substation is about one-fifth as large and weighs three-fifths as much as a permanent substation of the same rating. It is only 101/2 feet high, which will permit it to pass through underpasses on highways and is 8 feet wide by 14 feet long The combined weight of the transformer and trailer is 12 tons.

Blackhawk Hydraulic Equipment Catalog No. 41-H. A catalog which lists and pictures Blackhawk Pipe Benders Porto - Power Maintenance Equipment Hydraulic Hand Jacks, Gage-Equippe Jacks, Inverted Hand Jacks, and Wheeled Floor Jacks has been prepared for distribution by the Blackhawk Mg Co., Dept. W1651, Milwaukee, Wis. Th catalog illustrates and describes how "harnessed" hydraulic power can h employed in maintenance, production

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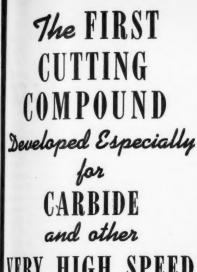


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Over the Editor's Desk

Reveille, or Taps?

THE hour has struck. The President of the United States has declared a "national unlimited emergency." From selling war supplies to the Allies we turned to supplying Great Britain as a measure of protection to our own nation, and at last have come to a realization that only by putting forth every effort—straining our resources to the utmost—can we be sure of maintaining the freedom of our own people and the independence of our country.

This is no time to sit back and let someone else worry about defense materials; American ships are being sunk by foreign submarines and we must have fighting equipment just as fast as it can be made. Our defense program is at the moment lagging for want of machine tools. Every machine tool in the United States—no matter how old—is needed and should be put to work immediately on ordnance work.

We need more plant owners like the small target pistol manufacturer in New England who took on a contract for .50 caliber machine guns. He started construction of a new plant and then found that he couldn't get machine tools. So he made a trip through the junk yards and abandoned factories of New England, gathering up rusty machine tools of all kinds and makes and shipping them to his plant, where they were torn down, cleaned up, and reassembled. Within six months after the first earth was turned for the new plant this odd assortment of tools was producing guns at the rate of 100 per day, and the output is steadily increasing.

Another company contracted to make light tanks, then found it couldn't get seamless tubing for hub linings. An army officer stationed at the plant remembered that, of the shell casings that were her turned out in another plant, a certa number were rejected because they fail to pass the rigid inspection standards shells. By cutting off both ends and he ing the tubing to size, enough seams tubing was obtained to permit tank in duction to proceed according to schedul

Another manufacturer took on a contract for twenty-five-ton tanks and the found that he, too, would be unable obtain needed machine tools unit the small shops of the area, including grages, repair shops, and even laundin signing up a machine here and anoth there for subcontracting work until he he enough machine tool capacity with range of 100 miles to start production.

This is the kind of action we need he chine tools are just as important in a national defense effort as guns—for with out machine tools there would be nogue But every gun will have its place in firing line, and every machine tool are take its place in the supply line main something, however small or simple, it will be useful in the defense of America.

France was beaten down because if French people realized their danger late; the English are fighting for their because they started to arm too late; mailer countries of Europe have be whipped into line one at a time because they failed to consolidate their forces we fail to arm in time our coast cities to be blasted and we shall find our our encircled by enemies who—if not abled tually to land on our shores—will ad life miserable for all Americans.

We believe that ours is the greatest tion on Earth, but this is no time for manners. Are we going to wake up in time or are we going to take the chance domination by foreign powers?

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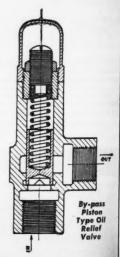
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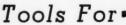
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National Defense

Gun Barrel Manufacturing Equipment

Builders Iron Foundry, Providence, R. I., is now building a line of gun barrel manufacturing machines in three sizes to handle guns from .30 caliber to 105 mm. bore. For the smaller sizes of barrels the line includes drilling, reaming, rifling, and chambering equipment, and for the larger sizes of guns, drilling, boring, and rifling equipment is offered. Presented here are the Deep Hole Boring Machine No. 3, and the No. 3 Deep Hole Rifling Machine.

The Builders Deep Hole Boring Machine consists primarily of a rigid bed upon which is mounted a geared head stock equipped with chuck for holding and rotating the barrel, a suitable sup port for the opposite end of the barrel suitable supports for the drill or boring bar, and means for holding and feeding the drill or boring bar into the worth

The headstock is equipped with three changes of speed and is driven through vee-bolts and pulleys from a.c. motor, providing a total of 1 motor are changes of speed with a minimum speed mounted of 20 r.p.m. and maximum of 375 r.p. the borin The spindle is mounted on anti-fricting pulled by the high transport to insure long life and estimate the high

The drill or boring bar is mounted in

a carriage drive by means of a sub stantial leadscrew powered by a sep arate feed moto which drives the screw through pick-off gears which provide a total 14 feed rates will a minimum 0.200 in. per mi and a maximum 3.00 in. per mi The range of spin dle feeds and speeds availab makes it possible

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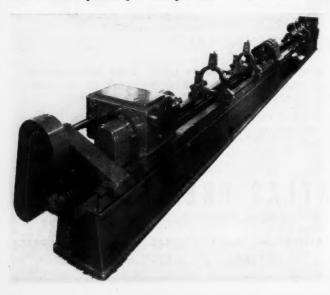
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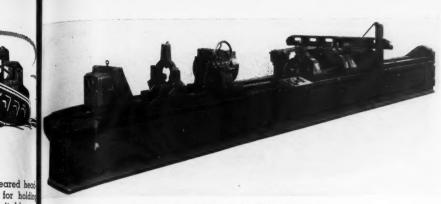
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Builders No. 3 Des Hole Boring Machin

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Builders No. 3 Deep Hole Rifling Machine

ll or bottom and feeding to operate at the most efficient speeds to the wait and feeds on all operations.

If with three the control of the carriage is powered by a separate wen through motor and can be moved in either direction at a rate of 60 in. per min. A total of motor-driven high pressure oil pump imum speed to the botting bar and a separate centrifuranti-friction and pump returns the used cutting oil for and at the settling tank to the intake of from the settling tank to the intake of the high pressure pump.

mounted in adjustable holding device for the inage drive an protects the machine and tools must damage from overload. The departs of the adjusted so that if the acque on the drill or boring bar exceeds a set limit, the tool is released in the arriage and at the same time a limit which is opened, stopping the spindle are interlocked for safety. The machine is at modern design and heavy control in per min maximum and the interlocked for safety. The machine is at modern design and heavy control in throughout, and is fitted commission. Per min maximum and the interlocked for safety. The machine is defined moved that is deviced for safety. The machine is defined moved to be indeed, so a look of a rigid one-piece dupon which is mounted equipment of bald, support, and index the barrel obe infield, and means for reciprocating and retating the rifling head.

The rifling head is carried on a tubuarity of the safety which can suitably

the cutter bar which can suitably e splined to the proper lead. The cuter bar is secured in the headstock, and be beadstock is driven by means of a ediscrew. The cutter bar is supported T a fixed guide and two movable guides. As the cutter bar is reciprocated, a hardened and ground pin engages the spline and causes the bar to rotate. Limit switches at either end of the stroke trip automatically.

Two push button stations in convenient locations control the motor, each station having five positions; reverse, third speed, second speed, low speed, and stop. The use of a four-speed motor assures the proper cutting speed and rapid return speed. The barrel is indexed manually by means of a handwheel driving through a worm and worm wheel. A motor-driven high pressure oil pump mounted on the headstock delivers oil to the cutting head.

The machine can be furnished with an adjustable sine bar which will make possible the cutting of a spline of any desired pitch. The machine is driven by a four-speed motor having speeds of 600, 900, 1,200, and 1,800 r.p.m., providing cutting speeds of 10 ft., 15 ft., and 20 ft. per minute, with return of 30 ft. per minute. The machine is completely equipped with safety devices and guards.

Morey 27-Inch Deep Hole Drilling and Reaming Machine

Morey Machinery Company, 410 Broome St., New York, N. Y., is now building a 27-inch deep hole drilling and reaming machine, equipped for boring

No. 3 Det

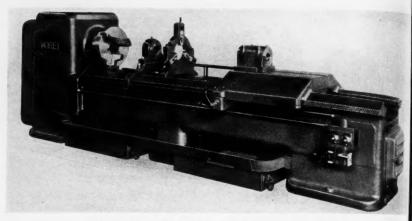
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Morey 27-Inch Deep Hole Drilling and Reaming Machine

155 mm. gun recoil cylinders. The machine is especially adapted for drilling, boring, and reaming cylinders, gun barrels, and similar work, and is available in any length required to suit special needs.

Spindle speeds are selected by the use of pick-off gears, and gears can be furnished to provide any desired speed. Feeds and power traverse in both directions are hydraulically-operated; thus an infinite variety of feeds is available from % in. per min. to 75 ft. per min. An essential feature of the design is the simplified control, the entire operation of the machine being controlled through the operation of two levers which are easily accessible from the operator's

The machine is equipped with a cool-

ant system with motor-driven pump, and is provided with safety devices which stop the machine in case of danger to work or tools. The coolant system is in terlocked with the operating mechanism so that the machine will stop instantly if the coolant supply fails, or if the dri or tool becomes too dull for efficient operation, or if the tool stops unusually hard spots in the material, and so on The machine is of substantial construction and is accurate in every detail.

Thomson Tandem Seam Welder for Welding Shell Casings

The machine shown in the illustration which is a Thomson No. 176 Tanden Seam Welder, is now being used in ser



FOR DEFENSE --- AND YOUR SECURITY USE KARELSEN -Diamond Pointed Emery Wheel Dressers

1/4 kt. to 10 kt.

Specify holder end for prices IMMEDIATE SHIPMENT

ESTABLISHED 1852 56 W. 45th ST., NEW YORK, N. Y. TEL. VAN. 6-5688

Some Facts About Us

Our business is 25% ahead of the biggest year in the history of our company!

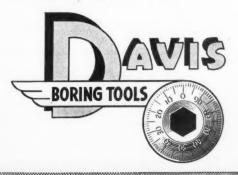
Now that sort of growth, brought about by the sudden heavy demands of National Defense, has naturally meant that we've had to inconvenience and disappoint some of our good friends and customers in matters of delivery. To say that we are sorry is true—but it does not deliver the needed tools.

Slowly but surely, however, we have been working out of this tremendous back log. We want to explain that we are steadily adding more skilled men in the shop, more engineers and tool designers, more floor space, more equipment of all kinds—and that we are gradually breaking through the jam.

To all you loyal customers we wish to express deep appreciation for the splendid cooperative spirit you have shown, and to assure you again that your orders will be taken care of as efficiently and promptly as this national emergency will permit.

DAVIS BORING TOOL DIVISION

Larkin Packer Co., Inc., St. Louis, U.S.A.



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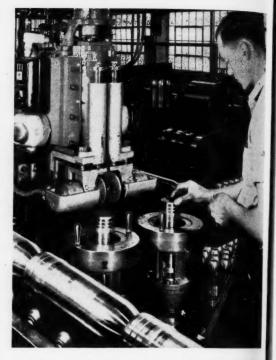
Using Thomson Tandem Seam Welder for Welding Discs to Anti-Aircraft Shell Casings

eral shell plants in the production of 75 mm. and 3-in. anti-aircraft shells. Specifications call for attaching 0.031-in. circular discs of bright, soft steel to the bases of anti-aircraft shell casings. The machine had to be adjusted to take care of 2.26-in. diameter discs for 75 mm. shells and 2.50-in. diameter discs for 3-in. shells, and the welds were required to be gas tight seals.

Part of the success of the unit is due to the ingenious, two-station sliding fixture which makes it possible to keep the machine in almost continuous operation and relieves the operator of practically all responsibility for

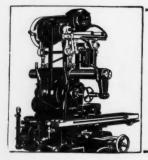
accuracy of work location and alignment. For each station the fixture is supplied with a quick-acting hand-operated chuck, designed to grip the body of the shell, and a spring-backed cup located at the bottom of the chuck which centers the casing on its nose end.

To perform the welding operation, the operator positions a shell casing in the chuck, places a disc in position on the



base of the casing, and brings the welding wheel into position by stepping on a foot lever. He also starts the shell retating by pressing a push button switch. Welding current is applied automatically and is cut off as soon as the shell has revolved 180 degrees, rotation of the shell also stopping automatically.

As soon as the first weld is complete, the operator shifts the slide and starts



OLD MACHINERY REJUVENATED

Why worry about machine tool scarcity when you can a crease efficiency of your present machinery with Remo Motor Drives. The only drive made to take ANY motor reasonable size—new, or USED. No need to buy new motors or new machines. Only drive on which motor may be switched instantly in case of "burn-out." Descriptive folder Frewrite Remco Products Corp., State and Hay Sts., York. ?a

REMCO MOTOR DRIVES

for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.

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the second welding cycle. While the second shell is being welded, the first station is unloaded and reloaded and the procedure is repeated. With one operator, a shell can be completed in 12 seconds, but if two operators are stationed at one machine, a shell can be finished in 9 seconds.

The welder is powered by a 40 kva. Thomson Tubular Secondary Transformer which features heavy-walled, non-cloging copper tubes. There are 16 points of heat regulation. Driving power is supplied by a ½ h.p. 1,200 r.p.m. motor. The two welding wheels are mounted on long vertical slides and are backed up by adjustable pressure springs. The ram supporting the slides is raised and lowered by a 4-in. bore adjustable to and away from each other to allow for variation in the size of discs for different sizes of shells.

Efficient water cooling is obtained by means of hollow water cooling shafts for the welding wheels and by encasing the welding wheel bearings in water troughs. Each wheel is connected to one

secondary terminal of the transformer so that current passes from one wheel through the disc and shell and into the other wheel. In other words, the entire secondary circuit is contained in the head of the machine. Primary current is controlled by a tube contactor and is interrupted to produce approximately 60 individual welds around the outer edge of the disc.

Machining Anti-Aircraft Shells with Tungsten Carbide Tools

The production of anti-aircraft shells is being speeded in Great Britain by the use of "formers" and tungsten carbide cutting tools. The illustration is a close-up view of a No. 12 Rydermatic Shell Lathe (British) being used to finish turn 4.5-in. shells, including the driving band groove. Note the triple "former" slide control employed to regulate the movement of the carbide tools used to turn the shell. The rear end of each slide carries a cam roller which rides in the



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July, 1941

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IDENTIFIED

IF PERMANENTLY

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IN THIS MACHINE



MARKING BY ROLLING IS FAST AND ECONOMICAL

PRESERVES
DIE LIFE AND
PIECE PARTS.
REQUIRES
ONLY FRACTION OF
APPLIED
PRESSURE
AS COMPARED TO
STAMPING.

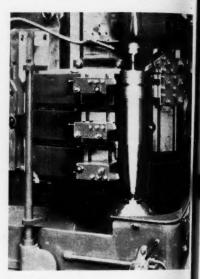
QUICK SET-UPS

MODEL 25 HI-DUTY MARKING MACHINE

This machine operates from your plant air line, and is one of numerous models built to produce fast, neat marking on metal parts. Hi-Duty marking machines may be had for practically any marking operation, and we will be glad to make recommendations upon receipt of your inquiries. Send prints or samples of parts to be marked, showing lettering and location, also state required production.

GEO. T. SCHMIDT, Inc. 1806 BELLE PLAINE AVE. CHICAGO, ILLINOIS guide-slot, thus controlling the movement of the slide backward and forward. A facing tool can be seen at the right. The turning and facing tools perform simultaneously.

The cutting tools are "Wimet" tungsten carbide, produced by A. C. Wickman, Ltd., Coventry. Tungsten carbide



British Shell Lathe Employing Tungsten Cabide Cutting Tools in the Turning of Anti-Aircraft Shells

powder for the manufacture of the tool is supplied extensively to Britain by the Carboloy Company, Inc., General Extric tool subsidiary in Detroit, Michigan

New Electric Thickness Gage in Measuring Aluminum Propelles

A new type of electric gage for more uring the wall thicknesses of hollor aluminum airplane propellers has been developed in the general enginering laboratory of the General Electric Company at Schenectady, N. Y. The instrument is applicable also to the thickness measurement of any non-magnetic metal when only one side is accessible, esc

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Typical Uses: -

Miniature Model Airplane Cylinders "Elim-

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Are You Equipped to Handle the Many DEFENSE PROJECTS Requiring

Precision Limits and Super-Smooth Finish on Small Diameter Jobs?

Hundreds of manufacturers — particularly those engaged in the defense program - have been quick to adopt this new, practical, inexpensive method to accurately size and finish internal cylindrical surfaces from .185" to

The Sunnen Precision Honing Machine does not require a skilled machinist — any intelligent workman with a few hours' practice can produce a super-smooth surface finish and hold accuracy to one ten-thousandth!

Can be set up and work located in less than a minute! Corrects taper and out of round holes.

We'll be glad to have a Sales Engineer call and demonstrate this machine in your plant — on your job — or

Send for **NEW BULLETIN**

2.400" in diameter.

giving complete details and examples of the wide range of uses for this new machine.





SUNNEN PRODUCTS CO.

7933 Manchester Avenue, St. Louis, Mo. Canadian Factory - Chatham, Ontario

PRECISION HONING SUNNEN MACHINE



G. E. Thickness Gage in Use for Mea-uring Thickness of Non-Magnetic Metal

if the non-magnetic metal is backed up by a magnetic metal. Thicknesses up to 11/2 inches, depending upon the electrical resistivity of the metal, can be measured within an accuracy of five per cent.

Brass sheeting, copper tanks and large pipes lend themselves to the use of the gage, it is said. One instrument has been sold to an airplane propeller factory and two to rolling mills producing brass products.

The gage consists essentially of a bridge circuit, voltage amplifying equipment and an indicating instrument. The bridge circuit comprises two inductances with U-shaped cores and a differential transformer. The inductances serve as a gage head and an adjustable balancing head.

The gage head, when placed against a non-magnetic metal sets up eddy currents within the metal which change the impedance of the head and affect the circuit bridge balance. The eddy currents increase with the thicknesses of the metal.

The effects of these eddy currents upon the circuit bridge, as shown by deflection of the indicating scale, are plotted upon a master curve for known thicknesses of a specific metal within the desired thickness range.

The gage head then is placed against the unknown thickness of that some metal and the scale deflection read. This reading is compared with a similar point on the master curve to determine ti thickness of the tested piece. It is essen tial that the contour of the test piece be the same as that of the pieces of known thicknesses from which the master curve was obtained.

The higher the electrical resistivity of the metal the greater the thickness that can be measured. With this gage which operates on 50 to 60 cycle alternating current, brass, which has a compare tively high resistivity, can be measured in thicknesses up to 11/2 inches, whereas copper, which has a low resistivity, can

GEM DRILL PRESS AND MACHINE VISES.



Modern Vises for Tool-room and Production. Sizes ranging from 3" to 101/2" opening. Strong, Versatile, Quick-Acting. Pay for themselves in time-savings.

Write for circular describing entire lim of GEM MACHINE VISES.

J. E. MARTIN TOOL & DIE WORKS Springfield, Ohio 548 State St.

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THEY PREFER TEXACO

VOUR grinding machines will produce more work when

wheels are kept free-cutting and the job is kept cool. Shops everywhere are improving their grinding opera-

Texaco Soluble Oil D will bring you these great benefits-

It lasts longer . . . in some cases, 50%.

It keeps wheels clean—prevents loading and reduces need of wheel dressing.

It assures quick settling of grinding dirt. It is a favorite with machine operators.

The outstanding performance that has made Texaco pre-ferred in the fields listed in the panel has also made it preferred by prominent users of machine tools everywhere.

These Texaco users enjoy many benefits that can also be your. A Texaco Engineer specializing in cutting coolants will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distributing plants in the 48 States,

The Texas Company, 135 East 42nd St., New York, N. Y.

- * More revenue airline miles in the U.S. are flown with Texaco than with any
- * More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.
- * More stationary Diesel horsepower in the U.S. is lubricated with Texaco than with any other brand.
- * More Diesel horsepower on stream-lined trains in the U. S. is lubricated with Texaco than with all other brands
- * More locomotives and cars in the U.S. are lubricated with Texaco than with any other brand.

TUNE IN: All-star radio program. Every Wednesday night, Columbia Broadcasting System, 9:00 E.D.T., 8:00 E.S.T.; 8:00 C.D.T., 7:00 C.S.T.; 6:00 M.S.T.; 5:00 P.S.T.



TEXACO Gutting and Soluble Oils FOR THE METAL WORKING INDUSTRY

be measured only to ¼ inch thickness.

The gage head, encased in bakelite, can be held in one hand for application against the metal. The remainder of the gage is contained in a steel carrying case and weighs about 30 pounds.

ket by Paasche Airbrush Co., 1910 Diversey Parkway, Chicago, Ill., for the application of black paint to 20 mm shells. The paint can be applied at a rate of 17,000 shells per 8-hour day.

The unit includes special automatic

Paasche Shell Finishing Unit

The accompanying illustration shows an automatic Airfinishing and Drying Unit which has been placed on the mar-



A 60,000 R.P.M. Unit

Steel Housing (For Safety)

A WORTHY COMPANION TO OUR FAMOUS "SUPER SPEED" MODEL S. S.—S. R.

SPECIAL GREASE SEALED BEARINGS NO LUBRICATION REQUIRED. AN ABUNDANCE OF POWER.

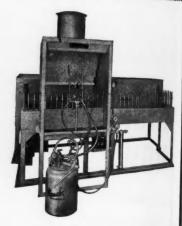
OTHER MODELS, ALSO AIR LINE FILTERS AND AUTOMATIC AIR LINE LUBRICATORS.

Write for details and data on Free Trial Offer.

M-B PRODUCTS

130 E. LARNED ST. DETROIT, MICH.

Export Office: 44 Whitehall St. New York, N. Y., U. S. A.



Paasche Shell Finishing Unit

aircoating and drying equipment, approximately 8 ft. long by 3 ft. wide equipped with a steel roller chain supporting 164 revolving spindle assemblies automatic off-and-on control for air brushes, varying speed pulley and reducer to operate the chain at speeds of 4 to 9 lineal feet per minute, all mounted on an electrically-welded steel frame.

The shells are dried after spraying by moving them through a drying over which is approximately 8 ft. long by 1 ft. 8 in. wide and 1 ft. 6 in. high. The

STOPS BREAKING OF TOOL BITS

because a hardened tool steel bearing, electrically welded in place, supports tool bit against heavy cuts.

CATALOG S-41



No. X 1-2-3-4-5

THE READY TOOL CO. STO IRANISTAN AVE.

"No smell, noise, jolt, etc..."



"Positively the most perfect machine on the market" was the manufacturer's description of this horseless carriage in 1900. And only the rich could afford such perfection. Parts were finished by hand. Interchangeability of parts was unheard of. Then came man-made abrasives such as "Carborundum", and later "Aloxite", to help bring about the mass production that has made available to everybody that miracle of transportation—the modern American car.

The use of man-made abrasives made it possible to finish parts to uniformly close limits of accuracy. Interchangeable crankshafts, cams, cylinders, pistons, gears could be produced in quantity for instant assembly. Better-built cars became available at new low prices. And the same mass production methods extended to other products have helped bring us a new standard of living.





A leader in the advancement of grinding, Carborundum now supplies abrasive products for obtaining finishes of unbelievable accuracy. Whether you are in a mass production industry or not, you will find it profitable to use Carborundum engineering service. The Carborundum Company, Niagara Falls, New York.

Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Company.



July, 1941

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MODERN MACHINE SHOP

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oven is insulated with rock wool and is equipped with an electric strip heater, thermostatically controlled to provide the required range in temperature. The unit also includes automatic airbrushes, "clamptight cover" pressure feed material tank, water, oil, and dirt separator to provide clean, dry air, with regulator and gauge, also exhaust unit with explosion-proof motor, spray booth, and duct to fan.

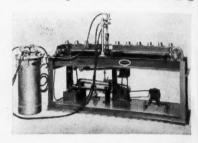
Eclipse Automatic Shell-Spraying Equipment

The Eclipse Air Brush Company, 400 Park Avenue, Newark, New Jersey, is building automatic spray equipment to handle the coating of the inside of trench mortar shells or other objects having a conical interior.

The machine is entirely automatic except that the shells are put on and removed manually. The shell is placed in a holder on a chain belt; it is carried along until it comes up to an automatic

spray gun where it is elevated on a special device that spins it as it fits over an extension nozzle attached to the automatic spray gun.

The timing of the machine is so ar-



Eclipse Automatic Shell-Spraying Equipment

ranged that an even coating is obtained on the cone-like interior, and the machine will not spray unless there is a shell in the holder.

Rate of operation is 1,000 an hour, using only 15 pounds pressure on the material and 20 pounds on the air.



Fast acting . . . made of copper, a superior lapping medium. Copper sleeve is the only wearing part and is replaceable. It is adjustable to compensate for wear and to preserve accuracy.

BOYAR - SCHULTZ CORPORATION 2120 Walnut Street, Chicago, Illinois

July, 19.

Float your ligh,

exactly where you want it . . . It stays put!





Illustrating the flexibility of the Dozor Floating Lamp. Can be placed in literally hundreds of positions.

Yes, float this lamp to any position with the touch of a finger. It stays there. No adjusting or locking, because a spring scientifically counter-balances the arms.

You raise or lower the Dazor Floating Lamp in just a second. Push, pull or twist it; swing it in a complete circle—always the same firm, stationary light, exactly where you need it.

For shop work, localized light is essential: to curtail glare and eyestrain... to promote safety. The Dazor Floating Lamp fastens directly to lathes, drills, presses, shapers, milling machines, benches, drafting boards, desks, walls, business-machine stands—anywhere. Also, a portable pedestal type, as shown at left.

Appointed electrical wholesalers have the Dazor Floating Lamp for quick delivery. Call your supplier now . . . or write for literature and distributor's name.

DAZOR MANUFACTURING CORP.
4483 Duncan Ave. St. Louis, Mo.

Dazor Floating Lamps

Fluorescent and Incandescent

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J & L Fully Automatic Internal Thread Grinding Machine

The Jones & Lamson Machine Co., Springfield, Vt., announces a line of fully automatic internal thread grinding machines which are available in three models; namely, the Model TG-63, Model TG-624, and Model TG-1230.

The Model TG-63 swings 71/2 in. and will grind threads up to 6-in. diameter and 3-in. maximum length, in work up to 10-in. maximum length overall. separate lead screw and nut for each different pitch is required. The Model TG-63 is a light, fast machine for work within its capacity range.

The Model TG-624 swings 7½ in. and

is designed to grind threads up to 61/2-

in. diameter and 5-in. maximum length in work up to 24-in. maximum length overall. This model is completely universal and is capable of handling toolroom or production work of any size of weight within its rated capacity.

The Model TG-1230 swings 21 in. and will grind threads up to 14-in. diameter and 5-in. maximum length, in work up to 24-in. maximum length overall. This model is also completely universal and capable of handling toolroom or production work of any size or weight within its rated capacity.

For Models TG-624 and TG-1230, a hardened and ground master lead screw and pitch change gears are furnished as standard equipment for grinding any pitch thread from 2 to 48 inclusive

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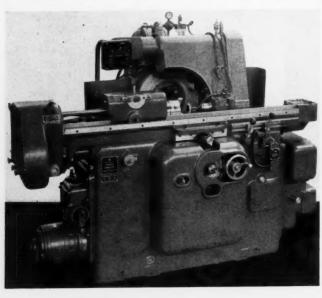
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On all models the grinding wheel spindle is automatically with. drawn from the grinding position to the wheel dressing position, the wheel dressed automatically, and the grinding wheel spindle returned to the working posi-



J & L Fully Automatic Internal Thread

Grinding Machine

ion. The amount dressed off the wheel s compensated for automatically, and he machine feeds in automatically on uccessive cuts until size is reached. When size is reached, the wheel spindle s automatically moved to the dressing sition and the machine stops. Each model is equipped with a direct

urrent wheel motor with rheostat conrol to provide a complete range of rinding wheel speeds. An air cylinder sused to obtain rapid movement of he grinding wheel spindle from workng position to dressing position and vice versa. Hydraulic operation of the Ample clearance is provided for gagand size whine is in the gaging position, a safety evice locks the position of the grind-21 in. and ing wheel spindle to prevent accident to diameter the operator while gaging or changing the work or should the air pressure

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The J & L Fully Automatic Internal or produc Thread Grinding Machine is said to reght within duce non-productive time to an absolute minimum. On some jobs, the manufacturer states, the grinding wheel spindle is removed from the working position to the dressing position and returned to the working position in less than two seconds, including the dress-

Colonial "Pull-Up" Broaching Machines

Developed primarily to obtain maximum production in machining round and splined holes, Colonial Broach Co., 147 Jos. Campau, Detroit, Mich., is now offering a complete standard line of improved "Pull-Up" broaching machines in streamline models ranging from 6 to 3 tons capacity and from 36 to 60-in. stroke. All machines provide completely automatic handling of the broach. Larger tonnages to meet special requirements can be obtained on special order.

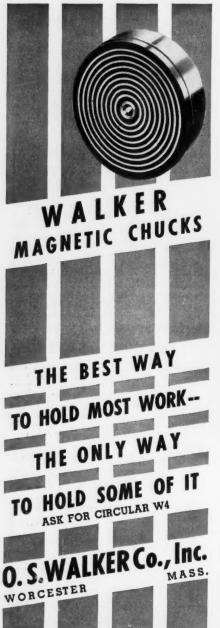
Peak capacities of the entire line of machines have been substantially increased over former types to provide greater reserve power and smoother operation when tooling is adapted for the normal capacities of the machines. The machine platen and puller brackets are unusually large, thus providing ample space for pulling two or more broaches at one time. Provision is



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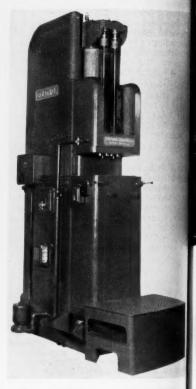
This FREE trial offer permits any concern with a satisfactory credit rating to try out any Kipp Air Tool for ten days. Grinders sell from \$9.75 to \$58.75. Chippers and Filers at \$19.75. The BB Grinder illustrated is only \$25. Kipp Air Tools give you highest speeds, lowest prices and are proving indispensable in tool rooms and production departments. New catalog gives details.

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| | REE CATALO |
| The state of the s | Send Kipp Air Grinder Model BB on your 10 day Free Trial Offer! |
| Medices Kiel Constitute | ☐ Send the new Kipp Air Tool Catalog! |
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| Company | *************************************** |
| Address | *************************************** |
| MADISON- | KIPP CORPORATION |
| 208 WAUBESA | ST., MADISON, WIS., U.S.A |



made for mounting spiral broach deheads when a mechanical means in rotating the broach is required to machine spiral splines.

Automatic handling of the broach obtained through the use of a hydraul handling mechanism, thus the operation need not touch the broach at any time



Colonial "Pull-Up" Broaching Machine

During the operating cycle, the bread is held in the bottom of the handling mechanism by locating bushings. Whethere operator starts the machine, after placing the part in position over the pilot end of the broach, a handling of inder located in the base of the schine advances the broach through the platen. An automatic puller located in the pull bracket then engages the broach.

Loading and unloading of the machine is easy, since the part is merely 400

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a hydraulic the operator at any time Double-index loading stations Mult-Au-Matic set up for 3-inch shell bodies.

The Mult-au-matic Behind the Men Behind the Gun

• This type "D" Mult-Au-Matic, arranged for double indexing, machines both base and nose of 3-inch anti-aircraft shell bodies at the rate of 75 pieces per hour. Other tooling and set-ups are available for shell bodies from 37 mm to 155 mm. Mult-Au-Matics feed the guns!

Mult-Au-Matics, installed today for defense projects, will be just as efficient, just as profitable, when later you wish to retool them for making gear blanks, clutch rings, pump parts, refrigerator units, electric motor cases, or any similar part that you may wish to produce in lots of 300 and up.

THE BULLARD COMPANY

BRIDGEPORT, CONNECTICUT

Machine

the broad handling ags. When nine, after over the ndling cyf the marough the located handling gages the

e machin rely dro ped over the top pilot of the broach. This easy loading and unloading feature, in combination with automatic handling of the broach, ensures maximum production for this type of broaching operation. The machine is equipped with dual hand control, thereby making it impossible for the operator to start the broach unless both hands are on the operating levers.

Regular Colonial welded construction, with steel castings for reinforcement wherever necessary, is used in all Pull-Up machines. A hydraulic tank of ample capacity is provided for efficient operation. An oil level gage mounted on the side of the machine and readily visible from the operator's position indicates the available supply of hydraulic oil. All machines are equipped with heavy duty, large volume coolant pumps.

The line of Colonial Pull-Up's comprises the following standard models: 6 and 10-ton capacities (normal rating), both with either 36 or 48-in. stroke, and 15 to 25-ton capacities, both with either 48 or 60-in. stroke. Special tonnages and strokes can also be supplied.

Red Ring 36-Inch Gear Shaving Machine

National Broach and Machine Co., 560 St. Jean, Detroit, Mich., has announced a horizontal 36,000 lb. Red Ring Gen Shaving Machine for finishing gears up to 36 inches in diameter, 2-inch pitch and having face widths up to 36 inches Contrary to general practice in shaving smaller gears, the cutting tool of this machine is driven by the work gear This is done to eliminate high driving torque which might otherwise result the cutter, as in smaller machines drives the work gear, especially when the work gear is very heavy. Under such conditions, the free cutting tool might gouge the work gear tooth surfaces at points of reversal or points of extra cutting.

With the heavy work gear driving the cutter, mounted in free ball bearing centers, the torque load between the cutter and the work gear is both constant and small. As in other Red Ring Gear Shaving Machines, the cutter head is built for crossed axes settings and is provided with a sine bar adjustment so that any setting can readily



AIR-WAY PUMP & EQUIPMENT COMPANY, 403 S. Jefferson St., Chicago, III

July,

Gear KLAMPACTO e ine Co., 5600 announced Ring Gear With Rapid Action g gears up inch pitch 36 inches in shaving TOGGLE MOVEMENT ool of this work gear gh driving e result if machines. ially when y. Under atting tool tooth surpoints of driving the ll bearing tween the both con-Red Ring he cutter s settings ar adjustan readily ith enclosed oru ball and gland. Save le, compact Priced lov.

WIAMPACTO" CLAMP 0 (4)Applies with a 2000 pound TODEL SOS pressure. Combines the deep throat of the standard

clamp with the tremendous holding pressure of a toggle movement. Equipped with two handles it is unnecessary to hang onto the clamp and work when fixing it in position—just a squeeze of the hand applies it with 2000 lb. pressure. The "KLAMPACTO" CEE CLAMP comes in 3 models 5", 6" and 10" jaw, respectively -hardened and tempered.

Send for a new catalog describing a complete line of toggle clamps and pliers.

16839 Hamilton, Detroit

Pacific Plant: 7263 Melrose Ave., Los Angeles, Calif.

July, 1941

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MODERN MACHINE SHOP 191



be duplicated. With the proper setting made, the cutter head is locked in position. Reciprocation of cutter and work gear spindle speed is varied by changing pick-off gears in the workhead drive.

An important feature of this new machine is its ability to develop the Elliptoid tooth form so effective in eliminating gear failures and rapid gear wear due to end bearing of gear teeth in operation. The use of the Elliptoid tooth form aids in reducing gear noise.

Vehicle gears and aircraft gears, because of the high torque they transmit and the unavoidable flexibility of their mountings, are extremely vulnerable to the effects of end bearing which, when it develops, materially shortens the life of the gears involved. When the gear teeth are given the Elliptoid form,

however (crowned or barrel shape), end bearing is defnitely prevented, even with the amount of deflection caused in heavy loading.

The amount of crowning is optional and can be varied by a graduated adjustment in the slidable head. As the

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cutter is reciprocated across the face of the work gear tooth, the work is automatically rocked, producing a deeper cut at the ends of the tooth than at the center.

The cutter head slide is adjustable for various center distances up to 50 inches. Its housing is mounted on a slide which carries it in a reciprocating motion parallel with the normal work gear axis. The head itself accommodates cutting tools of 7, 9 and 12 inches in diameter.

The 36-inch Shaving Machine is entirely automatic. Its action is under the control of microflex timing units which, in turn, are controlled by elements on the electrical panel board in the base of the machine. When desired, as, for instance, in setting up the machine, the automatic feed can readily



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MR. HILL JUST GOT HIS



He's the boss... but did he pull a "We'll build them ourselves," he says when they're talking about benches for the new assembly shops. Then the bill for the lumber came in, this morning. And, he started figuring layout and labor costs. That's when he hit the ceiling! - So did the costs!

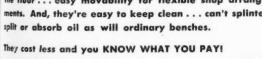




I tried to tell him when he gave me the orders to knock them together. I've seen it happen before. Build 'em solid an' it takes a lot of time. And it costs money.

Hope we don't have to move 'em or I'll have to pick up the pieces an' build them all over again.

"WE COULD HAVE TOLD HIM!" say the dollar-wise boys. It never pays to build your own; use "HALLOWELL" stee! benches! Get permanently smooth tops of steel, laminated wood or Masonite . . . lasting rigidity without bolting to the floor . . . easy movability for flexible shop arrangements. And, they're easy to keep clean . . . can't splinter,



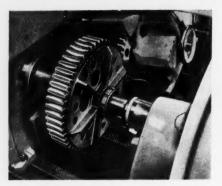




STEEL BENCHES

Free catalog describes this complete, standardized line . . . is yours on request on your letterhead. Just write STANDARD PRESSED STEEL CO., BOX 556, JENKIN-TOWN, PA.

QUICKER • EASIER • LESS EXPENSIVE IN THE LONG RUN • THAN TO MAKE YOUR OWN



Large Elliptoid Gear Being Shaved on Red Ring Gear Shaving Machine

be disengaged and the machine operated manually.

Hardened and ground ways minimize the effect of wear on reciprocating parts. All sliding elements are force feed lubricated, and an ample coolant system with reservoir in the base provides coolant in any needed volume. A push button control motor with limit

"WESTLEN" Self-Gentering REELS

One-piece ADJUSTABLE CLAMP holds stock in perfect position.



WHEEL automatically adjusts posts to suit diameter of coil.

CROSS PIECE easily converted to vertical or horizontal position and adjusts height of reel.

Coils are automatically centered by a few turns of adjustment wheel. No tipping — no back lash.

Write for details.

WESTLEN MFG. CO.

380 Mountain Grove St., Bridgeport, Conn.

switches opens and closes the splass plate.

Drafto Model A Chip Breaker Grinder

The Drafto Company, 207 Walnut St. Cochranton, Pa., has announced the production of the Model A Drafto Chip Breaker Grinder for grinding chip breaker grooves in carbide metal cutting tools. The machine has been designed to simplify correct tool adjustment to any angle necessary for accurate grinding.

A vise of universal construction with dual locking feature, mounted on the machine base, is equipped with a bull adjustment to permit setting of the two to any angle required. When correct tool adjustment is obtained, stops may be set, locking the vise, but permitting the tool to be removed for final inspection. The tool can then be replaced in the vise and locked rigidly for grinding

The grinding operation is performed by a diamond cutting wheel mounted directly on the shaft of an electrically driven ½ h.p., 110 volt, 60 cycle, ¾ r.p.m. motor. The motor is mounted directly on an actuating slide and when in operation, is moved horizontally across the machine. The actuating slide is mounted by means of anti-frience.



Drafto Model A Chip Breaker Grinder

tion construction for ease of operation. The horizontal motion of the arshown at the right of the machine, arries the diamond wheel across the factor of the tool, grooving the tip.

The depth of cut is determined

We Saved 60% he splash on our Trimming Costs'

with DELTA Metal-Cutting Band Saw

"We have three of your band saws in our foundry" says one plant manager (name on request). "We use them for sawing gates on our brass and aluminum castings. We figure that we save at least 60% on our trimming costs by the use of these machines, due to their low first cost, their low upkeep, their small blade cost and long blade life. We don't know where we would find a machine that is so useful!"

Widely Used For Many Jobs

This Delta Metal-Cutting Band Saw is being used for cutting aluminum castings and sheets, hard and soft cast brass, brass sheets and tubing, cast iron, copper, cold rolled steel, carbon tool steel, bronze and manganese, drill rod, high speed steel, monel metal, nickel steel, iron sheets and bars, malleable iron, babbitt, bakelite and other types of molded plastics, asbestos, slate, transite, pipe and countless other materials too numerous to mention. It cuts everything from cast-iron jig and fixture bases 1½" and 2" thick to draw die segments 6" thick.

EFFICIENT 14" DELTA WOOD-CUTTING BAND SAW

There is also available in the Delta line an unusually effi-cient 14" wood-cutting band saw-incorporating many unusual features. It offers many advantages over other ma-chines. See the Delta Catalog for details and prices.



Send coupon for latest Delta Catalog and special Band Saw Circular giving full details and specifications.

THE DELTA MANUFACTURING COMPANY (Industrial Division) 601-G E. Vienna Ave., Milwaukee, Wis.

Gentlemen: Please send me your new Band Saw Circular giving full specifications and details on the Metal-Cutting Band Saw, and your latest Catalog.

Name_

July, 1941 July, 1941

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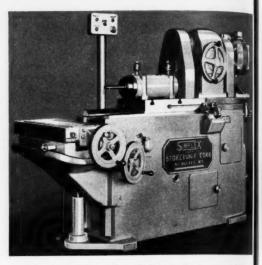
MODERN MACHINE SHOP

turning the knob set on the motor hinge bracket, shown at the left side. This knob is graduated for micrometer adjustment. A tank for holding kerosene is mounted directly above the diamond wheel guard, the kerosene being applied by means of a tube enclosing a wick to supply the correct amount of lubrication for the diamond wheel while grinding. Diamond wheels can be supplied in either 4 or 6-in. diameter, easily interchanged. The type of motor can be supplied according to customer specifications

Simplex 2U Knee Type Precision Boring Machine

Shown here is the Simplex 2U Knee Type Precision Boring Machine which has been brought out by the Stokerunit Corp., Milwaukee, Wis. The machine is designed to add flexibility to precision work, especially where a variety of jobs are to be handled by one machine. The knee is guided by hardened and ground ways and held in firm and accurate contact by anti-friction rollers mounted on eccentric studs which can be adjusted to take up all play.

By adjusting the knee vertically, fixtures of a simple design and a wide range of sizes can be used. The table mounted on the knee can be hydraulically indexed between two adjustable position stops or it can be moved by a



Simplex 2U Knee Type Precision Boring Machine

screw and handwheel. Handwheels are graduated on the rim to form large dials. Both the table and the knee can be equipped with dial indicators an length bars for precision setting when boring a number of holes in one piece.

Specifications of the Simplex 2U Knee Type Precision Boring Machine are a follows: table size, 13 x 27 in.; horizontal table travel, 10 in.; vertical table travel, 10 in.; hydraulic quick traverse 10 in; hand table adjustment, 10 in; distance center line of spindle to top of table with No. 3 spindle, 161/4 in. marmum, 61/4 in. minimum; spindle trave 12 in.; spindle speed range, 300 to 27 r.p.m.; spindle feed range, 0 to 20 h per min.; spindle rapid traverse, 200 in



SHARPEN YOUR OWN SI SAVE OVER 80% ON SHARPENING HACK, BAND, CIRCULAR SAWS

The WARDWELL SAV-A-SAW automatically sharpens same with teeth as fine as 32 to the inch at a speed up to 75 per minute. Savings on 2 gross of blades will pay for the michine. Assures keener cutting saws at extremely low cost Write for complete information

THE WARDWELL MFG. CO. CLEVELAND, OHIO 3166 FULTON RD.

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July, 194

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STANLE buffing,

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Is "Waiting For Big Machines" Stifling Your Production?



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STANLEY BENCH GRINDERS—for buffing, wire brush work, polishing, tool sharpening and light grinding. 6 models – 1/4 to 1 H.P. – wheels from 6" x 1/2" to 10" x 1". Grease-sealed ball bearings. Safety type wheel guards.

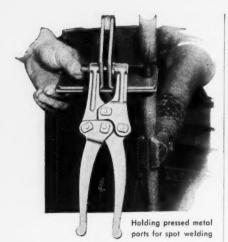
SNAGGING CASTINGS with a powerful, precision-built Stanley Sander and Grinder. Also used for grinding heavy steel welds; for sanding, buffing, surfacing on wood, metal or concrete.

INSTEAD of letting slow delivery on "big machines" bog you down, here's a way to get the work out . . . drilling, grinding, sheet-metal cutting, assembling . . . with Stanley Electric Tools. A nearby Stanley distributor will show you how these low-cost, rugged tools will relieve you on many jobs and pay for themselves time and time again.

The line includes Stanley Unishears for fast, accurate cutting of sheet materials; Toolroom, Contour, Bench, and heavy Portable Grinders; Electric Hammers, Drills, Screw Drivers and Saws. Ask your Stanley distributor to demonstrate, or write for literature. Stanley Elec. Tool Div., The Stanley Works, 137 Elm St., New Britain, Conn.



STANLEY
Electric Tools



DE-STA-CO Toggle Pliers Have Many Uses

Welding must be swift and sure; and the welding operator is entitled to the best tools that can be supplied. Here is shown a welding operation in which De-Sta-Co portable Toggle Pliers are used to hold the parts in place.

De-Sta-Co has quick-acting Toggle Pliers, or Toggle Clamps, suited to hold parts during many manufacturing operations . . . Send for Catalog No. 40, which shows photographs of clamp uses.

DETROIT STAMPING CO.

per min.; spindle drive motor (No. 1 spindle), 1 h.p.; spindle feed motor, 1½ h.p.; working height of spindle, 40 in.; height of machine overall, 64 in.; length overall, 87 in.; net weight, 5,500 lb.; shipping weight, 6,000 lb. The machine is also available in a larger type designated as the 3U.

Hunter Vertical Slotter

NEW

Tools

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Tool

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July.

A variable speed vertical slotter designed for die shop, toolroom, and general repair shop operation has been in



Hunter Vertical Slotter

troduced by the Hunter Engineering Co., Riverside, Cal. The Hunter Vertical Slotter incorporates a number of features that make it adaptable to a wide variety of machining operations. The work table is provided with longitudinal T-slots and is adjustable by hand feed in longitudinal and transverse directions and vertically.

tor (No. 1 motor, 14 dle, 40 in.; in.; length 5,500 lb. ne machine type desig.

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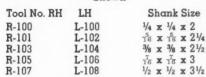
TUNGSTEN CARBIDE TIPPED TOOLS Price \$1.00 Each In Any Size

NEW LOW PRICES — INCREASE PRODUCTION — CUT OPERATING COSTS

Tools are tipped with Tungsten Carbide, and are suitable for machining cast-iron, brass, bronze, aluminum, non-ferrous materials (such as hard rubber, bakelite, fibre), and tough alloy steels up to 500 Brinell hardness.

Left—100 Series

Left Hand-Reverse Image, Right Hand Shown





Right-200 Series

Tool No. Shank Size 200 1/4 x 1/4 x 2 15 x 16 x 21/4 3/8 x 3/8 x 21/2 7 x 7 x 3 204 1/2 x 1/2 x 31/2



Below-300 Series

Tool No. Shank Size 300 1/4 x 1/4 x 2 301 15 x 15 x 21/2 302 3/8 x 3/8 x 21/2 303 1/2 x 1/2 x 31/2

STANDARD TUNGSTEN CARBIDE TIPPED TOOL BITS

In lots of 12 assorted in any Series; 100-200-300 Series an extra 10% will be allowed: also in lot of 50 assorted 20% discount will be allowed.



Sizes not listed as well as special TIPPED TOOLS will be quoted upon request. When ordering, state tool number and quantity desired. We Carry Silicon Carbide Emery Wheels for Grinding Tungsten Carbide Tool Bits.

SEND FOR OUR NEW 1941 GENERAL CATALOG

TOR MACHINERY EXCHANGE, INC.

251 CENTER STREET

NEW YORK, N. Y.

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Vertical

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Maximum stroke of the ram is 4½ in. The ram may be tilted either right or left through a 10-deg, angle for the cutting of tapered keyways, and so on. The number of strokes per minute can be varied from 90 to 180. A positive acting clutch which may be operated from either side of the machine makes it possible to stop the ram at any point.

The Hunter Vertical Slotter is extremely compact, being only 63% x 38 x

48 in. in size.

Barber-Colman Improved Bench Center

An improved bench center for inspecting a wide variety of small work up to 6½ in. diameter x 18 in. long is announced by the Barber-Colman Co., 207 Loomis St., Rockford, Ill. Streamlined in appearance, the center is said to provide an unusually accurate and fast method for inspecting both cylindrical and circular pieces.

The base of the bench center is cast from nickel cast iron and is of well ribbed box construction with finished ways cast integral. Both headstock and tailstock are adjustable and may be rigidly clamped at any position on the bed by quick-acting, powerful clamps. The tailstock has a spring-loaded, hardened and ground sliding center which can be readily locked in position by moving a quick-acting lever to the left. When moved to the right, the lever unclamps and retracts the center, all in one motion.

The headstock center is fixed and all three sliding members locate from the same reference surfaces, thus ensuring

accuracy.

The slide, or indicator base, is provided with a vertical post and is used with a standard type indicator clamp. Other types of indicator holders can be easily attached if desired. The design of the ways and clamps ensures frequick, sliding action to the centers and indicator base when they are unclamped.

The Barber-Colman Improved Benci Center is designed primarily for inspecting cylindrical and circular pieces which are either held between centers or are mounted on arbors, as in the case of a gear or gear blank. The work is usually inspected by being rotated by hand under a dial indicator



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July, 1941

J-B TAP GRINDER



Taps sharpened on the J-B TAP GRINDER retain their accuracy and last longer.

You can sharpen right or left hand taps (2, 3, 4 or 5 flutes) uniformly gn the chamfer . . . grind any taper or angle of cham fer desired . . accurately ser or quickly change amount of relief.

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EDWARD BLAKE CO.

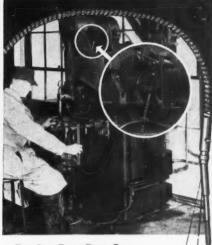


 Pinneers in the riveting field. Head rivets from mallest to 56" diameter, either by noiseless spinneer of the pinneer method.—Sixes to met all needs.—Types include Vertical and Horizontal Multiple Spindles.

Write for literature—and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.

SILLIMAN AVE. BRIDGEPORT, CONN.



TRU-LAY PUSH-PULL CON-TROLS on Taylor-Winfield Welding Machines

Self-Aligning 8° deflection in both directions

FAST, ACCURATE PRODUCTION with **PUSH-PULL** CONTROLS

"Weld it," say Taylor-Winfield Corporation—offering welders equipped with TRU-LAY PUSH-PULL CONTROLS for top production possibilities.

Today, instant, accurate and safe control of equipment rate high. So you find "PUSH-PULL" on production machines, clutches, valves, switches, factory trucks, cranes, etc.

Push-Pull Controls operate easily and instantly—don't become noisy or need adjustment.

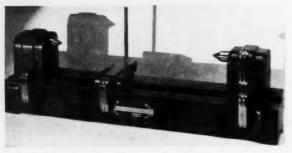
Free Booklet: Writefor a copy. Tell us the problem. We may be able to help.

PUSH-PULL CONTROLS

AMERICAN CABLE DIVISION 230 Park Avenue, New York City



AMERICAN CHAIN & CABLE COMPANY Inc.



which registers the amount of runout or eccentricity. This method of inspection also shows any variations of the true circular form of the piece. In addition, work may be checked axially to determine side runout or "camming" action on the sides of shoulders or col-

P & W Standard Measuring Machine

Developed by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn., the P & W Standard Meas-

uring Machine illustrated herewith is said to provide a simple and accurate means for checking gages, tools, paris, and so on. The machine reads directly to 0.0000 inch.

The P & W Standard Measuring Machine

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consists essentially of a master ber dividing screw, and means for controlling measuring pressure, all mounted on a rigid bed. The master bar is graduated at each inch interval with extremely fine hairlines, visible only through a microscope. The measuring head includes a microscope, with two hairline graduations used when setting to match the hairline of the master but and a precision dividing screw which subdivides 1 inch.

The bed is a heavy casting of fine grained, seasoned cast iron. rests on three feet, thereby eliminating

A Storage Unit That REDUCES HANDLING

"Stacked and Still Accessible"

of Parts and Materials

Because Stackbins are portable containers—not fixtures—parts and materials can be carried to departments, from machine to machine, or held in stockrooms, without being transferred from one container to another. Stored in Stackracks, any Stackbin is instantly accessible when its contents are needed-without disturbing any other bin.



STACKBINS are individual hopper-fronted stacking bins. de-signed for storage.

STACKRACKS are indi-vidual units which lock together to form storage racks of any size, shape or transportation and capacity into which Stack assembly.

STACKBINS in STACKBACKS offer a storage system that reduces.

tem that reduces handling, saves valuable space Write us for complete details and low prices.

STACKBIN CORPORATION

53 Troy St.,

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July, 19

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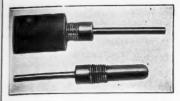
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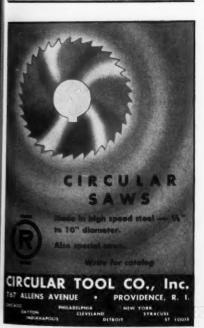
NEW FLEXIBLE ABRASIVE WHEEL



Designed for precision work. Used for removing burs, fins, tool marks on various types of production work. A very indispensable aid in speeding up production.

Write for catalog and free sample.

Field Abrasive Specialty Mfg. Co. 201 LOWE BLDG. DAYTON, OHIO





You can save time, increase tool life and improve tooled surface finishes by preparing your soluble coolants and cutting compounds with a "LIGHTNIN" Mixer.

Whether you "make-up" for individual machines or have a central circulating or cooling system, a "LIGHTNIN" of the proper size and capacity is available to solve this problem for you. "LIGHTNIN" MIXERS CAN BE READILY CLAMPED ONTO ANY TANK OR VESSEL. They have been successfully used in large plants for mixing cutting oils for over twenty years!

Write for a catalog of "LIGHTNIN" Mixers. State the size of tank or tanks you use and the current available. Complete details will gladly be furnished.

MIXING EQUIPMENT CO., INC.



P & W Standard Measuring Machine

the possibility of distortion.

The master bar, which extends the length of the machine, is made of seasoned steel and bears microscopic reference lines on highly polished plugs. These reference lines or graduations are placed 1 in. (25 mm.) apart and are used for setting the measuring head at even inch (25 mm.) positions.

The measuring head provides subdivisions of the inch. The dividing screw attached to the dial adjusting knob moves the measuring anvil longitudinal-

ly and the measurement is read directly from the three dial scales beneath the magnifier on the head. Reading from left to right on the English measuring head, the first scale indicates tenths and hundredths of an inch, the second scale indicates thousandths and the thousandths, and the third or vernles scale indicates hundred-thousandths of an inch. In the metric system, the first scale indicates millimeters, the second scale tenths, hundredths, and thousandths of a millimeter, and the third or vernier scale two ten-thousandths of a millimeter.

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The electrolimit pressure tailstock furnished with the P& W Standard Measuring Machine increases the speed and ease with which measurements can be made and assures almost perfect precision. According to the manufacture, the tailstock accomplishes two thingsit makes any measuring pressure from 1 to 2½ lb., in increments of 8 oz., instantly available, and makes possible the duplication of exact measuring pressure even with different operators.

A milliammeter conveniently located on the measuring head shows when the correct measuring point has been reached. By turning the dividing screen

HYDRAULIC PRESSES FOR DENISON MAKES ALL SIZES FROM "BABY" BENCH MODELS TO And whatever your press requirements may be - from this big, 400-ton, 20-foot high, C-frame press down to the versatile two-ton bench-type model - Denison can fill them. For these typical examples merely prove Denison's versatility in designing and building hydraulic presses. Denison presses feature peak efficiency and safety . . . accurate, dependable hydraulic operation . . . compact, space-saving, fully self-contained design . . . electric or manual safety controls that prevent injury to operators' hands.

THE DENISON ENGINEERING COMPAN

103 W. CHESTNUT STREET

mendations. No obligation.

COLUMBUS, OHIO

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A Denison Hydraulic Press will help boost your production. Write today for recomad directly eneath the ding from measuring BALL BEARING es tenths he second CYLINDERS and tenor vernier andths of , the first he second and thouthe third Speed sandths of Chucking stock fur-Equipment ard Meas

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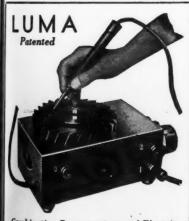
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The operation of all types of Chucking Equipment can be profitably accelerated with Airgrip Ball Bearing Cylinders, accuracy promoted and time formerly spent in adjusting fueing, etc., saved for production. Maptable also to many other types of work there are control can be afficiently applied. where air control can be efficiently applied. Write us for application suggestions and

AIRGRIP CHUCK DIVISION OF ANKER - HOLTH MANUFACTURING CO. 264 & CONNERS ST., PORT HURON, MICH.



Combination Demagnetizer and Electric Etching Pencil. Marks symbols in hardest steel. Demagnetizes instantly. One of our models popular in tool rooms

Luma Electric Equipment Co. DEPT. MS TOLEDO, OHIO SPEED · LONG LIFE LOW COST! WESSON Standard Carbide Tipped Core Drills and Reamers

Wesson standard carbide tipped tools give you exactly the qualities you want to meet today's requirements-faster production, longer life, lower cost.

Many Wesson carbide tipped tools are actually PRICED LOWER than the same size and type of regular tools. You can't afford NOT to take advantage of their greater speed, longer life, and economy.

Send for complete



1220 Woodwood Heights Blvd., Ferndale, Mich.

OHIO



30% More Range Thousands of Speeds

Make old tools pay dividends with Given Vari-Speed Motor Drives. Infinitely variable speed control without shifting belts or gears. Immediate delivery provides complete modernization AT ONCE.

'Stop the obsolescence of tools you now have. Get the production you need today, with quality performance and speed. Given Vari-Speed Drives are highly endorsed by all users. Many repeat orders. A type for every tool. 1 to 7½ h.p. Patented. Sold on approval. Money back if not entirely satisfied in 60 days. Send for Bulletin.

Given Machinery Company 2014 SANTA FE AVENUE LOS ANGELES, CALIFORNIA

GIVEN VARI-SPEED DRIVE on the measuring head, the work is pressed against the tailstock anvil until the pointer of the milliammeter reaches the center of the scale, thereby indicating that the desired measuring point has been reached. The size is then read directly on the graduated dials in the measuring head.

The P & W Standard Measuring Ma. chine is available in capacities of 12 in (300 mm.), 24 in. (600 mm.), 36 in. (1,00 mm.), 48 in. (1,200 mm.), and 80 in (2,000 mm.). Regular equipment includes bed; measuring head equipped with microscope and lamp; electrolimit pressure tailstock with power unit and DO-9 milliammeter; cylindrical supports; elevating table; graduated master bar, and tool kit containing lap, and so on. Pedestals and brackets can be furnished to order for the 36 and 48-in machines, and a cast iron table with legs is available to order for the 80-in machine.

Sheldon Lathes with 1-In. Collet Capacity

The Sheldon Machine Co., Inc., 185 N. Kilbourn Ave., Chicago, Ill., as nounces an 11 and 12-in. lathe having 13%-in. diameter spindle with 1-in. epacity hole. The lathes, which as available with either pre-loaded ball of



Sheldon Lathe with 1-In. Collet Capacity

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July, 1941 July, 1941

BURKE Milling Machines



No. 4 Motor Driven Milling Machine

Mounted on Cabinet Column

Burke motor driven milling machines Nos. 1, 2, 3, and 4 are specially suited for handling small, difficult work on a production basis.

Write for complete information.

BURKE MACHINE TOOL CO.

297 E. 16th St.

Conneaut, Ohio

SMITH & MILLS SHAPERS



Automatic lubrication — forced feed. Multiple disc clutch and brake. Quick feed changes. Direct reading feed and stroke dials. Power rapid traverse to cross feeds.

THE SMITH & MILLS CO

CINCINNATI

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MOREY VERTICAL SHAPER

8" stroke 12" stroke

Accurate — simple for toolroom manufacturing. Self-contained motor drive.

Ask for Circular 726

MOREY MACHINERY CO., Inc.

410 BROOME STREET

NEW YORK, N. Y.

precision roller bearing headstocks, can be supplied in both bench and floor types with semi-quick or full quick change gear boxes, plain aprons or worm feed aprons with power crossfeed, and choice of motor drives, including the Sheldon needle bearing overhead motor drive and the Sheldon four-speed lever-operated underneath motor drive which is entirely enclosed in a cabinet leg. A complete line of attachments and accessories is offered.

Twistite Drill Press Vise No. 3

J. A. Richards Co., Kalamazoo, Mich., is now offering the Twistite Drill Press Vise No. 3 shown herewith for use in machine shops, toolrooms, and so on. The vise has a jaw width of 3 in. and is instantly adjustable to any capacity.

To operate, the handle of the vise is turned to the left until the smooth rod is free. A pull then opens the vise to any desired capacity. To close, the handle is pushed until the movable vise jaw contacts the work. A twist to the right applies pressure. Since the screw on the vise is oversize, very little effort

is required to clamp any material.

The Twistite Drill Press Vise No. 3 is of modern, streamline design with no



Twistite Drill Press Vise No. 3

sharp edges to cut the operator's hands, and is equipped with four lug feet for fastening either to the workbench or clamping to the drill press table.

Pines Horizontal Spindle Burring Machine

The Pines Engineering Co., St. Charle, Ill., announces a horizontal spindle burring machine for reaming, burring faring, threading, or honing tubing and rods. The machine features an air-operation of the property of the machine features and air-operations.



LEIMAN BROS. AIR PUMPS

LEIMAN BROS. INC.

1683 Christie St.

Newark, N.J.

IN HANDLING AIR
MEANS RAPID
DEPENDABLE
PAPER
FEEDING

This

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1806

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Also for Gas Furnaces, Liquid Agitation, Gas Pumping, etc.



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St. Charles, pindle burarring, factubing and

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Gas Liquid , Gas , etc.

3

July, 1941 July, 1941



This machine quickly stamps details and serial numbers into name plates.

Write for Particulars

GEO. T. SCHMIDT, Inc. 1806 Belle Plain Ave. Chicago, Ill.

Hand Cut ROTARY FILES

High Carbon and High Speed Steel. All sizes—all shapes. Write for catalog.







GRAND RAPIDS Combination Tap & Drill Grinder MOTOR DRIVEN



Tap Grinding ---

Tests have prover that taps ground on a Grand Rapids will cut with less than half the power required for hand ground taps and will stay sharp for several times as long, even when hand grinding is done by the best mechanics.

Drill Grinding ---

For grinding taper or straight shank drills, and drills with enlarged shank or sockets, You can grind small drills and then large drills, straight and then taper shank drills with one simple adjustment of the tailstock.

WRITE FOR CATALOG

GALLMEYER & LIVINGSTON CO.

308 STRAIGHT AVE., S. W. . GRAND RAPIDS, MICH.

ated work chuck controlled by a limit switch which is connected with the feel movement lever that advances the spindle. By means of this mechanical electrical arrangement, high speed operation, with production speeds up to 1,200 pieces per hour on some classes of work, is said to be possible.

Shown in the illustration is a typical



Pines Horizontal Spindle Burring Machine

production setup in which three opertions are performed in a single pass; namely, tube outside diameter is burst end is faced, and inside diameter is reamed.

Simplicity of setup, flexibility, and ease of operation and adjustability in handling a wide range of tube and of sizes are additional features claimed in the Pines Horizontal Spindle Burring Machine.

The machine is designed for hip speed production under grueling combitions, and is built accordingly.

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CONTINUOUS HINGES

AUTOM

AUTO MOULDING & MFG. CO.

228 S. CANAL ST.

CHICAGO

WRITE FOR STOCK LIST

U.S. HEADS

STANDARD SINCE 1915



The United States Drill Head Co.

1954 Riverside Drive CINCINNATI, OHIO



BOTTLENECK?

... Buy BRADY - PENROD

Keep production high with BRADY-PENROD Coolant and Circulatory Pumps - motor driven, open impeller, centrifugal type. If you get poor results from standard pumps, let us produce the special type you need for volume business. Our pumps have hydraulic efficiency as high as 70%. They are designed to eliminate wear on the pump; reliable for use with abrasives. Equal efficiency maintained, pumping water or light oil. All five models available with separate rating established at 400 SSU; 750 SSU; 1250 SSU; 2000 SSU.

%H.P. MOTOR REPLACES %H.P. - through superior pump design. All motors have 20% surplus power.

CAPACITIES: $\frac{1}{2}$ "to 2"pipe; 4 to 100 gallons per minute. Special models for larger capacities. Pressure up to 100 feet head.

FREE Send for Bulletin N-B541.

BRADY - PENROD, INC.

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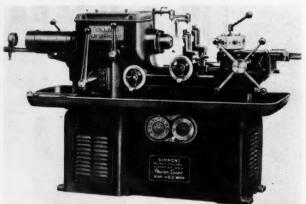
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Simmons No. 2 Micro Speed Turret Screw Machine

of MODERN MA CHINE SHOP, is now available with cabi-

Simmons No. 2 Micro Speed Turret Screw Machine

The Simmons No. 2 Micro Speed Turret Screw Machine, product of Simmons Machine Tool Corp., 1745 N. Broadway, Albany, N. Y., which was announced on page 142 of the October, 1940, issue

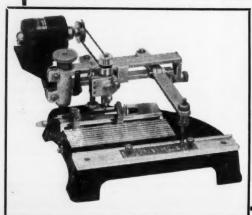
net base and selector dial control. In the cabinet base i mounted the electrical equipment with the selector dial control immediately of the front within instant reach of the The headstock is now equipped with a spindle brake to allow instantaneous stopping under all operating conditions. The machine is driven through the Simmons Micro - Speed Drive Unit, providing a multiplicity of

Your Engraving Problem Solved AUTO-ENGRAVER!

operator.

driving belts.

Engraves-Iron, Soft Steel, Copper, Brass, Aluminum and All Plastics.



Letters are engraved from master type (block and script letters) furnished with machine. Also designs, emblems, signatures, etc., can easily be traced from original drawings. Engraves on flat and round surfaces. Vise capacity—4½"x15". Set-up quickly changed. After 30 minutes a novice can engrave perfectly.

spindle speeds through the multiple "V

Price complete . . \$195.00 With universal motor Write for complete details.

Auto Engraver Co. 366 FIFTH AVE. NEW YORK, N. Y.

July, 19

No. 2 Micro urret Screw schine

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RK. N. Y.

FOR Precision Grinding Formed Milling Cutters used in the manufacture of rifles, pistols, etc. . . .

THE BARNES

MOTOR DRIVEN
PRECISION CUTTER
GRINDING MACHINE

General Machinery Corporation

140 FEDERAL ST., BOSTON, MASS.

Telephone, Liberty 4826

TO HELP YOU TEACH THE NEW GRINDER HAND



how to get maximum service from your Diamond Tools — we have some effective training material. Send for it. No obligation.

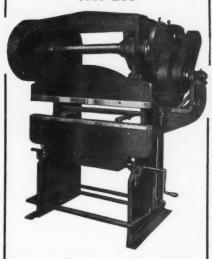
KOEBEL DIAMOND TOOL CO. 9346 Grinnell Ave., Detroit

KAEBELITE DIAMOND TOOLS

Multi-Point, Multi-Set, Multi-Edge, and Single Set. Diamonds for All Industrial Purposes.

CHICAGO STEEL PRESS

No. 253



Does 40% to 60% of the forming work turned out by the average shop.

Here's a profitable, economical brake ideally adapted for rapidly forming metal sections such as in stoves, refrigerators, soda fountains, steel cabinets, metal furniture, steel boxes, and a great variety of sheet metal specialties. Its variable speed drive operates from 17 to 50 strokes per minute. The No. 253 CHICAGO STEEL PRESS is accurate compact, and ruggedly constructed of highest quality materials.

Sizes 4, 5 and 6 ft. capacities up to 10 gauge.

Write for Circular No. 253

DREIS & KRUMP MFG. Company

7418 LOOMIS BLVD.

CHICAGO

ILLINOIS

July, 1941

MODERN MACHINE SHOP

213

July, 194

Alco Releasing-Type Tap Holder

The Alco Tool Company, 835 Housatonic Ave., Bridgeport, Conn., has placed on the market a releasing-type tap holder for hand screw machines and turret lathes.

Features of the holder include a rigid



Alco Releasing-Type Tap Holder

drive without the use of pins and elimination of bushings. Each holder will hold several sizes of taps within its capacity. Only one wrench is needed to tighten the nut to hold taps securely. Right and left hand threads can be cut equally well without necessity for adjustment.

"Standard" Speed Lathe with Double End Arrangement

The Standard Electrical Tool Co., 8th and Evans, Cincinnati, Ohio, has added to its line of speed lathes a lathe having a double end arrangement as shown in the illustration herewith. The construction of the unit permits the spindle at each side to be operated at random, thus it is possible to start and stop one side without interfering with the operation on the opposite end.

Incorporated in each spindle housing is a combination clutch and brake which is actuated either through a hand lever as illustrated or by foot pedal control. Simultaneous action disengages the clutch and applies the brake, while instantly stops the work spindle, while the motor continues to operate. Slight pressure on the hand lever or fool pedal places the work spindle in neutral position.

The illustration shows the "Standard" Double End Speed Lathe equipped with a three-jaw drill chuck on each end of spindle. Optional equipment includes a universal lathe chuck, Morse taper socket or collet chuck.

Will a

Flatter Surface improve your product?

Many people have parts, such as seals, which can be improved by greater accuracy of the lapped surface.

Acme lapping technique has been developed to make possible the finishing of parts in production to within five millionths of an inch. (.000005") from absolute flatness. The cost is surprisingly low.

Our Engineering Department is available for advice on lapping problems. No obligation, of course.

May we discuss your problem?



The straightness of these bands formed by interference of light waves reflected from the flat-lapped steel surface gives a true measure of its flatness.



ACME INDUSTRIAL CO.

Makers of Standardized Jig and Fixture Bushings

212 N. Laflin St.

Chicago, III.

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'ELECTROBLAST'' No. 2 Full Muffle Type Furnace



High grade insulated Furnace. Silicon Carbide Muffle 7"x43/6"x31/2" Complete with built in blower ready to run, \$138. Blast actuated by powerful Universal ball bearing motor. May be had as a hydrogen Brazing Furnace complete with Pyrome-ter as illustrated, \$266. Unit will reach 2350° F. in less than an hour at 10¢ per hour. Indispensa-ble for small intermittent jobs. Write for descriptive literature.

STARK TOOL CO.

Originators of the American Bench Lathe
Est. 1862 Waltham, Mass.

SAVE TIME CUT COSTS

27,000 R.P.M.

At this high speed, MOTO Dremel TOOL reduces cost of wheels, points, etc. on grinding, buffing, finishing and other daily shop operations. An indispensable tool for pattern shops, tool rooms and production departments.

MASTER MODEL 2 Only \$16.50

Ideal for exacting work in hard-to-get-at places... often saves time of tearing down and re-setting dies. Pays for itself on first job in many cases. MOTO-TOOL is precision built for precision work. Has full bakelite shock-proof housing, oil-less (oil-sealed) bearings and built-in cooling fan. Weighs only 13 oz. Balanced armature eliminates vibration. Operates on either AC or DC 110-12 volt current. Sold by better dealers everywhere. for Dremel catalog and combination offers.

DREMEL MFG. CO., Dept. 221-G, Racine, Wisconsin

CULLMAN SPROCKETS

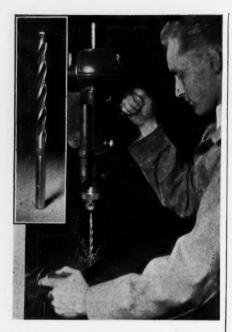
45.000 SPROCKETS IN STOCK FOR YOUR IMMEDIATE NEEDS.

We also have in stock Diamond Chains for all Roller and Block Sprockets.

Send for Catalog

Cullman Wheel Co.





LONG SPIRALLING

CHIPS in place of small metal particles . . . effortless feeding instead of full strength pressure . . . life that is at least seven times that of the old type counterbore . . . these are the up-to-the-minute advantages offered by

PUTNAM HI - SPEED CONTINUOUS PILOT COUNTERBORES

PUTNAM
TOOL COMPANY
2981 Charlevoix Ave., Detroit, Mich.

Increased production due to the facility of quickly starting and stopping the work spindle is said to be reflected by the double end arrangement of the lathe. Each work spindle being independent of the motor shaft permits the motor to operate at all times, thus eliminating frequent starting and stopping and reflecting in low current consumption and long motor life with a minimum amount of maintenance. The moments of the starting and stopping and the starting and the starting and the starting and stopping and the starting and stopping and the starting and the starting and stopping and



"Standard" Speed Lathe with Double Ed Arrangement

tor operates only through a toggle switch at the front of the machine.

Available in sizes of ½, 1, and 2 has with any standard motor speed, its Standard Double End Speed Lath serves two operators independently, thus conserving floor space.

G-E Atomic-Hydrogen Arc Welders

General Electric 35 and 75-ampet atomic-hydrogen arc welders of improved design for use in repairing tool and dies, for filling in flaws or blowholes in steel and bronze castings, in the fabrication and repair of hard-lived metals, and so on, have been make available from the General Electric Co. Schenectady, N. Y. Modern in design the welders are compact and self-controlled.

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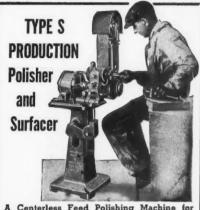
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A Centerless Feed Polishing Machine for Small diameters or a Surfacer for flat work. Feed may be quickly disengaged and machine adjusted from horizontal to vertical or any position between—in a few seconds. Work or belt table 13½" long x 4½" wide.

Write for folder.

PRODUCTION MACHINE COMPANY

GREENFIELD . MASS.

EASY and ACCURATE DRILL GRINDING

It's easy to grind drills accurately on a BLACK DIA-MOND Drill Grinder.

It holds the drill in a fixed position while making a complete revolution. It grinds the lips exactly the same length and gives the drill the proper angle and clearance to insure easy cutting.

No. 1 grinds No. 60 to 11/32" No. 2 grinds 1/16" to 1/2" No. 3 grinds 1/8" to 3/4"

Write for Builetin No. 122



July, 1941

MODERN MACHINE SHOP

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G-E Atomic-Hydrogen Arc Welder

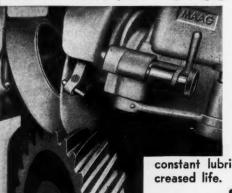
tor used in previous units, the improved welders have a specially designed reactive transformer which combines the functions of both the transformer and reactor. As a result, the weight of the welders is said to have been reduced more than 30 per cent and electrical characteristics improved.

Built-in power-factor correction, a feature of the welders, provides for efficient installation and helps to avoid power-factor penalties. Fan-forced ventilation is said to provide cool operation even at high currents or on high duty cycles.

G-E Electrode Pressure Gage

An electrode pressure gage designed to measure the pressure between the electrodes of resistance welding machines has been announced by the General Electric Company, Schenectady, N. Y. The gage is for use either as a standard for checking existing gages or pressure indicators on spot, line, or projection welders, or for checking the electrode pressure at the time of set-up before proceeding with production work. It also may be used by testing laboratories for pressure determinations, or by industries interested in checking the

CUT AND GROUND GEARS



Spur and Spiral Gears Cut and Ground with MAAG "'Criss-Cross" Image

Accurate ... Interchangeable ... Noiseless

All tooth-surfaces on ground Maag gears show the typical "criss-cross" image. This network of grinding marks, like handscraping, insures thorough,

constant lubrication of teeth and greatly increased life.

SHORT DELIVERIES

Send drawings with inquiries.



Cosa Oversea Trading Corp. 5000-04 Chrysler Bldg., New York, N. Y. (Ask for Gear Specialist)

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YOU USE TAPS
YOU NEED

WALTON

TAP

EXTRACTORS

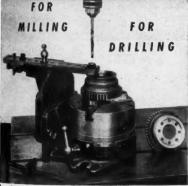
The price of a new tap is nothing, compared to the cost of removing the broken one by any other method. WALTON BACKS it out; saves the thread (and your time).

Stock sizes #4 to 1½" in 2, 3 and 4 - flute styles. Sent on 30 day free trial. Booklet 132 gives details and prices. Write for it today.

The Walton Co.

98 ALLYN STREET
HARTFORD CONN.

HARTFORD "Superspacer"



Cut shows Superspacer equipped with arithing attachment.

Swings work 11" dia. Holes up to ¾" dia. can be drilled using standard A. S. A. removable bushings. Stop is used when bushing bar must be shifted. Write for folder.

Hartford Special Machinery Co.



MARK says:

Breakdowns occur in the best operated plants and the best operated plants are now taking care of these breakdowns with the New Marquette A.C. Arc Welder. The savings gained through fast repair work has put a smile on the face of many production men and plant owners.

MARQUETTE

A.C.ARC WELDER

. . . can work for you, too, if given the opportunity. Write us today for our latest descriptive literature.

BUY THE BEST ... BUY MARQUETTE

MARQUETTE

MANUFACTURING CO., INC. MINNEAPOLIS, MINN.



Reliable Standards

MEASUREMENT

A gage block can be relied upon in direct proportion to its wearing qualities.

FOR DEPENDABILITY

There is no substitute for

Dearborn Gage Company

Chrome Plated GAGE BLOCKS

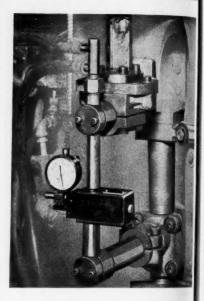
DEARBORN GAGE COMPANY

> "Originators of Chromium Plated Gage Blocks"

22035 Beech Street
DEARBORN - MICHIGAN

pressure of various kinds of springs in compression.

The gage measures pressures from a to 4,500 lb.; an automatic stop safe guards it against damage should pressures of more than 4,500 lb. be applied. Consisting simply of a calibrated stelly yoke and a micrometer dial indicator, the gage is easily applicable to existing resistance welding machines without the



G-E Electrode Pressure Gage

need for jigs or other auxiliary equipment.

When electrode pressures are to be measured preliminary to production work, the gage is inserted between the electrodes so that they press on the pass on the top and bottom of the gage yold. The electrode pressure is adjusted unlithe desired pressure is registered on the gage dial. The gage is then withdrawn and the welding machine placed in operation.

The dial indicator is direct reading, no calibration curves or multipliers are necessary. It has two scales, one to reading in 10-lb. intervals up to 1000-lb. intervals. Each gage is carefully calibrated at the factory before shipment.

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GWILLIAM THRUST BEARINGS

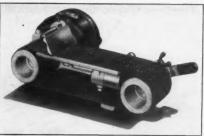


Type CC—Designed to Take Combined THRUST and LIGHT RADIAL LOADS

 Especially adapted for slow speed and heavy thrust duty, such as marine rudder posts and similar installations. To order only — any quantity.

OUR CATALOG ON REQUEST.

358 Furman St., Brooklyn, N. Y.



An Inexpensive NEW ABRASIVE BAND GRINDER . .

"Built Like a Machine Tool"

The Hormel-M Grinder is sturdily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on the belt. Ball bearing throughout. Equipped with ALEMITE LUBRICATION complete with grease gun.

Write for illustrated folder on this and other styles and sizes.

HORMEL-M GRINDER

WALLS SALES CORP. N ST. NEW YORK, N. Y. WARREN ST.



Shown above: Sutton Feeder and Push-Out Collet

SUTTON TOOL COMPANY

2895 W. GRAND BLVD., DETROIT, MICH. **Accessories for Screw Machines**

READY

to defend screw machine PRODUCTION

Sutton Feeders (with long-life spring

tension).

Sutton Collets (the only collets with Diamond Serrations).

Ask for Complete Catalog.



Northern Types S.A. and L.S.A. Cranes

To supplement its line of Super-Cranes, Northern Engineering Works, Detroit, Mich., has announced a line of



Northern 5-Ton Crane

cranes consisting of the Types S.A. and L.S.A. These cranes are similar in design to the larger, heavier line but are said to provide a more economical installation where service is not extreme and continuous.

Features of the Types S.A. and L.S.A. cranes include one-piece, all steel welded trolley frame construction;

horizontally-split hoist gear housing heat-treated, hardened, rolled steel, machine-cut hoist gearing; splash-lubricated hoist gearing and bearings; removable, safety-type mechanical load brake; standard foot-mounted ball bearing motors; special, heavy wide finage triple girder, bridge construction, and safety crane wiring construction Controls are of a type to assure the handling and are arranged for either cab of floor operation.

Beverly B-3 Heavy Duty Shear

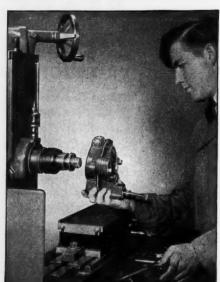
The heavy duty shear manufacture by Beverly Shear Co., 3004 W. 111th & Chicago, Ill., has been redesigned an now features an exclusive ball bearing hold-down device This improvement is said to greatly increase the stability of the unit in acting as a guide when metal is passing over the table of the shear. Metal can be turned in any direction to make any shaped cut desired by the operator. The ball joint of the hold-down offers no resistance in turning the metal and makes possible the cutting of highly polished metals with

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New Grinding attachment

Simple to Attach . . . Extremely Accords

Designed to fit most surface grinders to use on tool, die and gage work.

Grinds slots, recesses and surfaces, etc. which are impossible to reach with large wheel.

Eliminate expensive set-up time in which small wheels are necessary.

Spindles of both vertical and horizontal attachments can be shifted to numerous positions.

Write for full details

Liberty Tool & Gage Works
235 GEORGIA AVE. PROVIDENCE, LI

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Works NCE, IL

uly, 1941

DICKERMAN HITCH FEED



Adaptable to any ordinary punch press without press alterations. Feeds from any position on any style die. Quick set-upeconomical for short runs.

Write for folder No. 84.

H. E. DICKERMAN MFG. CO. 321 Albany Street

Springfield, Mass.

PORTABLE ELEVATOR

FOR PRESS DIES

Combines elevating table, die separator.

> Send for circular.



This equipment is available in two sizes for dies measuring to 32 and to 40 in. in length.

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HAND CUT ROTARY **FILES**



GROUND ROTARY CUTTERS

FLEXIBLE SHAFTS and MACHINES



BUILDERS . OF HIGH QUALITY MACHINES ONLY

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out the danger of marring. The improved shear, which is known as the Beverly B-3, is said to be highly effi-



Beverly B-3 Heavy Duty Shear

cient in cutting $^3_{16}$ -gauge mild steel and 10-gauge stainless steel.

The body of the shear is made of high grade chrome-nickel steel, design-

ed for unusual strength and long wearing qualities. The blades used are of high-carbon, high-chrome steel content and can be quickly changed or adjusted as needed.

Westinghouse "Condens-O-Weld" Capacitor Discharge Resistance Welding Control

Designed for welding aluminum and alloys such as are used in the aircraft industry, a capacitor discharge resistance welding control, to be known as the "Condens-O-Weld," is announced by the Westinghouse Electric & Mg. Co., East Pittsburgh, Pa. The unit is a complete control designed to include in one floor-mounted cabinet all the necessary apparatus required to control an electrostatic energy storage type of welder. Accessories not included with the control are foot switch, pressure regulator, and pressure gage, since these items are normally supplied by the welding machine manufacturer.

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The Condens-O-Weld is designed for operation on 230/460 volts ± 10 per



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July, 194

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IMPROVED Balanging Ways



Four chilled iron discs rotate on special sensitive bearings. For balancing, straightening and trueing. Write for details.

| Swing | 20" | 40" | 60" | 72" | 96" |
|---|-------|-------|-------|-------|--------|
| Greatest Dis- tance Between Standards | 20" | 30" | 30" | 66" | 88" |
| Capacity in Ibs. | 1,000 | 2,000 | 2,000 | 5,000 | 10,000 |

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SAVAGE NIBBLING MACHINE

FOR TUBE SLOTTING AND TUBE SHAPING— FOR FAST AND ACCURATE CUTTING OF FLAT SHEETS BY TEMPLATE OR TO A SCRIBED LINE.



Cutting Capacities

Flat Sheets Mild Steel 3/4" Tough Alloys 3/4"

Tubing

Wall thickness to 18"
1" I.D. to 36" O.D.

Throat Depth 9" to 36"

Showing Tube Cutting Attachments and Samples of Work

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W. J. SAVAGE COMPANY
KNOXVILLE Since 1885 TENNESSEE

Figneer Manufacturers of Nibbling Machines



Fully Universal. Operates freely at any angle—in any plane. Maximum distance, collet end of spindle to table top, 8%". For the most complete Miller in the low priced field, get the Vernon.

Don't wait for a big machine to do a small job — Prompt Deliveries on the VERNON LINE.

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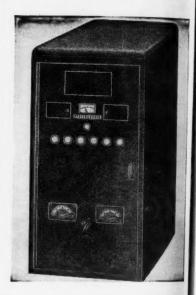
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American Swiss File & Tool Co. ELIZABETH, N. J.

AMERICAN SWISS

cent, 3 phase, 50 or 60 cycles. The charging circuit and its control charges a 2640 mfd capacitor bank to 3,000 volts. Spot welding speeds of 40 to 80 spots per minute can be obtained, depending on the size of capacitor bank.

Charging of the capacitor may take place during the entire time interval between successive welds, thus reducing the power demand to a minimum



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July, 1

Westinghouse Type CD-2 ''Condens-O-Well' Capacitor Discharge Resistance Welding Control

When the Condens-O-Weld is used with certain welding machines, line kva demands as low as one tenth of that taken by a typical single phase at aluminum welder are said to be possible.

Two-Direction Hanna Speed Control Valve

To meet the demand for a dependant control of the speed of pneumatically actuated cylinders, Hanna Engineeric Works, 1765 Elston Ave., Chicago, Il has brought out the Two-Directin Hanna Speed Control Valve shown her with. The valve controls the speed of

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FOR REAL PROTECTION AT VITAL FASTENINGS



In every Elastic Stop Nut, a resilient non-metallic collar eliminates thread play automatically... and holds thread faces of nut and bolt in a constant pressure-

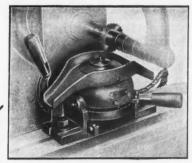
contact. Cannot be loosened by vibration or hard service.

CATALOG contains a graphic explanation of the Elastic Stop principle, presents test and application data, and lists the complete line of nuts. • Write for a copy.



ELASTIC STOP NUT CORPORATION
2327 VAUXHALL ROAD . UNION, NEW JERSEY





DEARBORN Automatic Chucking and Indexing Fixture MILLS OVER 1000 PARTS PER HOUR

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accuration operation.

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A heavy-duty portable grinder for grinding die sections, rough castings, and trimming bar stock.

\$ 750.00 F. O. B. DETROIT

With Motor and Abrasive Wheel

Capacity: 12" long, 7" high. Width of grinding face, 4". Tool, 8" x 22". Height to center of spindle, 38". 1 h.p. motor—1750 r.p.m.

BRADLEY MACHINERY CO.

211 JOS. CAMPAU ST.

DETROIT, MICH.



July, 1941

MODERN MACHINE SHOP

227



Two-Direction Hanna Speed Control Valve

piston travel. Installed between the operating valve and one end of a cylinder, the valve provides adjustable control of inflow as well as exhaust of the air independently to and from one side of the piston. A single valve will therefore control the piston speed in two directions. For extra sensitive adjustment and control of piston speed, two control valves, one for each end of the cylinder,

are recommended by the maker.

The Two-Direction Hanna Speed Control Valve is constructed so that the two adjusted orifices which control the air flow in the two directions can be set before flow takes place, thereby ensuring control from the very start of movement. The valve body is cadmium plated and all other valve parts are made of corrosion resistant materials. The valve is recommended for 250 lb. maximum air pressure and is available in ½, ¼, ¾, ½, ¾, and 1-in. pipe size.

Acromark Stamping Tools

The illustration shows a section of angle iron cut from a steel bed frame and the dies, type, and holders used for stamping this angle iron frame. The stamping tools are marketed by The Acromark Corp., 251-257 N. Broad St., Elizabeth, New Jersey.

The angle iron frame shown was stamped cold by means of the dies, type, and holders. The two holders assembled with type and the one solid die were placed into a 125-ton press and the entire impression was made at one stroke of the press. The angle iron

Lubrication Can't Fail with ROLLWAY PUMPS on the job

Today—lubrication MUST not fail—it's too vital a factor—production must go on without interruption.

Rollway Pumps are demonstrating their reliability in performance in the leading plants of the country—on high production work where positive lubrication must be insured.

The motion of Rollway Pumps is rolling—no gears to jam on foreign matter—operate efficiently at capacity when driven at low speeds—they develop high vacuum and may be set considerably above surface of liquid being pumped without danger of loss of prime.

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July, 1941

July, 1941

Why THOR STAMPS Last Longer



because they're made of a special, correctly-heated alloy steel. Central striking point assures uniform marking: Thumb side marking assures easy

You get more mark per dollar with THOR STAMPS. Write for catalog and

The Pittsburgh Stamp Co., Inc. 112 CANAL ST. PITTSBURGH, PA.



DROP FORGED STEEL

Standardized Die Sets, embodying many exclusive features, a listing of more than 195,000 stock sizes and 46 different styles afford a service that is unsurpassed.

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Chicago, Ill.

MORE CUTTING-OFF WORRIES

luers Patented Cutting-off Tools Eliminate 90% of All Cutting-off Troubles

Luers cutting-off tools are lowering costs and keeping production high because the patented Luers blade has a combination of three important advantages found in no other cutting-off blade. These three features are built into the blade itself, and retain their efficiency throughout the entire length of the blade:

1. The Luers blade is T-shaped, which provides built-in side-clearance and prevents excessive side friction.

2. The Lucrs blade is tapered throughout its entire length, which provides built-in back

The Luers blade is hollow ground on top, cutting a curved chip that is free to expand without binding.

But that's not all. These cutting-off tools give a

finer dirplane finish. They require grinding on the front face only. They cut the non-productive time needed to remove, grind, insert and realign. They have been enthusiastically adapted by many of America's largest industrial producers. Special holders are available for all automatic and hand screw machines.

Produced under license issued by John Milton Luers Patents, Inc.



EMPIRE TOOL CO. BT90 GRINNELL AVE.



Acromark Stamping Tools

frame was made from reclaimed railroad track which is extremely hard in some places due to the continual hammering of car wheels passing over it.

The piece of angle iron was stamped with the Acromark outfit after 10,000 impressions had been made, and, according to the manufacturer, there were little or no signs of wear to the dies, type, or holders.

Brown & Sharpe No. 00 Rotary Geared Pump

In answer to the demand for a small lubricating, transfer, or hydraulic pump, the Brown & Sharpe Mfg. Co., Providence, R. I., has added to its line of pumps a No. 00 rotary geared pump with helical gears which provide smooth, quiet operation at speeds that adapt the pump to direct motor drive. The pump is especially adapted for supplying oil or coolant where small capacities are desired, and is suitable for use with pressures up to 1,000 lb. per sq. in. The pump is self-lubricating, no external lubrication being required.

The materials have been carefully selected to suit the requirements of the services of the parts. Gears are heattreated steel and are made separately from the shafts, which are case hardened. The housing cap and stand are cast iron. Shafts turn directly in the cap and end stand, no separate bearings being used. An oil seal is used to prevent leakage, thus providing for fre turning action. The bearing surface of the stand, end cap, and housing are ground to an oil-tight fit and these

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GRINDING WHEEL DRESSERS--VISES

We manufacture the only complete line of Grinding Wheel Dressers and cutters and will gladly suggest the proper one for your wheels. The exclusive solid steel slide makes Simplex Vises stronger and more serviceable.



Desmond Hex Dresser



Simplex Machinists' Vise



Desmond Diamo-Carbo Dresser, best tool room dresser.

Write for catalog M showing complete line of Desmond Dressers
and Simplex Vises and name of your nearest dealer.

DESMOND-STEPHAN MFG. CO., URBANA, OHIO

Canadian Desmond-Stephan Mfg. Co., Ltd.—Hamilton, Ont.

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July, 1941



Do three vital things: (1) Filter the compressed air, (2) accurately regulate it, (3) introduce exactly right amount of oil-fog for complete, automatic lubrication of every working part of air tool. Check tool wear; prevent down time; sweeten performance; speed production. More than 60,000 Norgren Lubricators in use.

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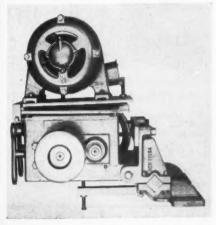
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FOR THE JOB



(Fig. 216)

No one drive meets all your requirements advantageously. Be sure to choose the correct type drive to fit your need.
We offer V Belt Drives, Gear
Box Drives. Send us a list of
your requirements and get
unbiased recommendations.

PRODUCTION EQUIPMENT CO.

5219 CHESTER AVENUE

CLEVELAND

OHIO

parts are assembled without gaskets.

The design of the pump is simple and compact. The flange mounting adapts the pump for direct motor drive and for assembly as an integral part of the ma-



Brown & Sharpe No. 00 Rotary Geared Pump

chine, and, with a separate foot-type mounting bracket, meets satisfactorily practically every mounting condition. The pump is furnished with or without the mounting bracket.

The Brown & Sharpe No. 00 Rotary Geared Pump is made to operate in one direction only, either right-hand (clockwise) or left-hand (counter-clockwise). The direction of operation is determined by the direction in which the shaft rotates when viewed from the driven end. The direction of rotation is indicated by an arrow located between the suction and discharge ports. Unless otherwise specified, the pump is furnished for right-hand operation.

Specifications of the No. 00 pump are as follows: maximum r.p.m., 1,725; capacity, gal. per hour at 0 lb. pressure at 1,725 r.p.m., 30; suction and discharge pipe connection, % in.; shaft diameter, % in.; net weight without foot, 3½ lb.; shipping weight without foot, 6½ lb.; net weight foot only, 1½ pounds.

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Acro Die Cradle

A handy tool for diemakers to be known as the Acro Die Cradle has been announced by the Acro Tool & Die Works, 2815 Montrose Ave., Chicago Ill. The tool is, in effect, a universal parallel unit. It is adjustable in legth and is designed to eliminate makeshift methods for supporting dies, jigs, m

NICHOLSON EXPANDING MANDRELS

(Sliding jaw and tapered slot type)

For holding work while being machined between centers on lathes, grinders, millers, shapers, etc.



Both types sold singly or in sets. Made of tool steel, hardened and accurately ground. Economy tools. Prompt delivery at this time.



Also make larger sizes taking up to 7".
Write for Bulletin.

W. H. NICHOLSON & CO.

136 OREGON ST.

WILKES-BARRE, PA.

TYPE A-STEP JAW DESIGN

| Size No. | Range of Bores Taken | Net Price |
|----------|----------------------|-----------|
| 1A | 1/2" to 1" | \$10.80 |
| 2A | 1" to 11/2" | 14,40 |
| 3A | 1 1/2" to 2" | 20.70 |
| 4A | 2" to 3" | 30.60 |
| 5A | 3" to 4" | 36.00 |

TYPE B-STRAIGHT JAW DESIGN

| Size No. | Range of Bores Taken | Net Prior | |
|----------|----------------------|-----------|--|
| 1X | 1/2" to 18" | \$ 9.00 | |
| 2X | " to 21/32" | 9.90 | |
| 3X | 21/32" to 3/4" | 10.80 | |
| 00 | 3/4" to 7/4" | 12.60 | |
| 0 | 7/4" to 1" | 14.40 | |
| 1 | 1" to 11/4" | 16.20 | |
| | 11/4" to 1 18" | 18.90 | |
| 2 | 1 % " to 2" | 26.10 | |
| 3 | 2" to 21/2" | 36.00 | |

July, 19

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pump are 1,725; ca-. pressure and disin.; shaft t without nt without only, 1%

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ESIGN Net Price \$10.80

20.70 30.60 36.00 DESIGN

> Net Price \$ 9.00 9.90 10.80 12.60 14.40

16.20 18.90 26.10 36.00

July, 194



STACKING BOXES

An excellent all-purpose shop box. Sturdy all - welded construction. Heavy skids act as a positive stacking lock and re-inforce box at point of maximum wear. Made in any size or gauge of metal. Immediate shipment from stock on standard sizes.

601-10"x16"x6"-18 ga. \$.95 602-12"x18"x8"-16 ga. . . 1.25

F.O.B. Philadelphia-Any Quantity

American Metal Works, Inc. 1519 Germantown Ave., Philadelphia, Pa.

Mark It Quickly

Made with 1 to 10 wheels.



knurled knob for con-secutive numbering.

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NO PUMP-PRIMING

Speed up operations — save time and money with the new Ruthman Gusher Model P-3. For use where small quantity of coolant is required. Ball-bearing with split second

control. Safely handlesmaterial containing grit and abrasives. All the features of the famous Gusher Line. There's a Gusher model to fit your needs.



P-3 is available in external right or left discharge models, flangemounted and immodels. mersed

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Write for engineering data and specifications.

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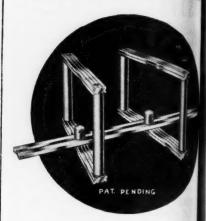
"ALL ANGLE" MILLING MACHINES

MILLING ATTACHMENTS

GLENDALE, CALIFORNIA, U. S. A.

al parts, and so on, while drilling counterboring, tapping, milling, or grinding. Incorporating several safety and time saving features, the unit said to be extremely helpful in speeding up production.

The Acro Die Cradle is easy to me nipulate, having only two thumb-screen





Acro Die Cradle

for quick adjustment to any desired length. The standard height of the parallels is 7 in. and there is an if justment for length up to 20 in. The die cradle is made of high grade atte hardened and ground to close tole ances, thereby assuring accuracy. Iti sturdily constructed and light in well so that it can be moved about easily.

Wilder Micro-Projector

In the announcement of the Wilder Micro-Projector, product of Georg Scherr Company, 130 Lafayette St., No. York, N. Y., which was published page 254 of the May, 1941, issue MODERN MACHINE SHOP, the will illustration was used. A correct illustration of the Wilder Micro-Projector shown herewith.

The Wilder Micro-Projector is a high

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July, 191



BUFFER-SLOT COUPLING

It gives you greatly increased benefits from your Motor Drives by combining the flexibility of the Belt Drive with the economy of the Direct Drive and eliminating the defects of both.

PREVENTS SHUTDOWNS

By correcting misalignment and absorbing lad shock and torsional vibration it eliminates the cause of many past failures of the Direct Drive. Particularly beneficial to machinery, having Ball or Babbitt Bearings.

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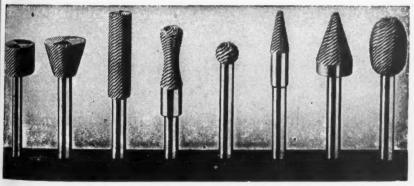




FORD HAND CUT



ROTARY FILES



Just a few of the many shapes in our standard line.
Write for full information.

M. A. FORD MFG. CO.

408 PERSHING AVE.

DAVENPORT, IOWA

July, 1941

MODERN MACHINE SHOP

235



Wilder Micro-Projector

ly accurate machine for measuring or comparing objects by means of a magnified shadow image and is widely used for the rapid and accurate inspection of gears, screw threads, punchings, and other irregularly-shaped pieces.

"Allvent" All Purpose Ventilating Fan

An all purpose, quiet operating, ventilating fan for industrial and commercial applications is now being manufactured by Autovent Fan & Blower Co., 1805-1827 N. Kostner Ave., Chicago, Ill., under the trade name of "Allvent." Formerly available with three-bladed construction, the fan has been redesigned so that it is now supplied as a multiple-bladed unit.

The new blade assembly is designed to overcome normal restrictions in the air flow, to prevent "churning" the air and, at the same time, absorb shocks and sudden changes in air loads which might overtax motor capacities. The new type fan wheel is said to deliver a maximum volume of air at lowest power consumption. Operation of the fan is with V-belt drive from a standard speed (1,725 r.p.m.) motor.

The Allvent All Purpose Ventilating Fan is furnished in capacities of 5,000 to 23,000 c.f.m. inclusive and is ruggedly constructed, with all parts dis-formed. Fan blades are of 14 or 1 gauge sheet steel, depending on fan

COLLAPSIBLE MACHINE TAP that can be used as a stationary tap with handle, or as a rotating tap by removing handle. Instant trip at set point.

Chasers are rigidly supported and are hooked into tapered seat of hardened and ground center pin to insure positive open-ing and closing.

DIE HEAD designed for use on Hand Screw Machines or Automatic Machines where the die head does not revolve.

Opened by self-contained trips which are die spindle at any point.

Also die heads in similar style for rotating spindles.



Type "M" Collapsible Tap MACHINE & TOOL CO.

MICHIGAN Also all styles of "Bolt and Pipe Threading Ma-chines" and "Roller Pipe Cutting-Off Machines"

Type "G" (Non-Rotating) Die Head

July, 194



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uly, 1941





IF YOU ARE FINDING HIGH SPEED STEEL IS HARD TO GET --

Remember, there IS something you can do that will help. The situation already is serious - and growing worse. Cobalt has disappeared from the market — tungsten is following fast. Against the day when deliveries may stop completely, why not:

> a) Send those high speed tools you make, and let us Nusite harden them.

> b) Tell your suppliers you want the tools they sell you Nusite treated.

Nusite gives greater hardness throughout, and double toughness. Your tools will not only do more work - but will LAST LOTS LONGER!

BETTER HARDENING - BETTER RESULTS.

Perfection Tool & Metal Heat Treating Co.

1740-46 W. HUBBARD ST.

CHICAGO, ILL.

size. Units up to 36-in. diameter have six blades and sizes up to 54 in. have eight blades. The assembly is rigidly held in place by four tubular steel sup-



"Allvent" All Purpose Ventilating Fan

ports welded to a square panel of 16, 14, or 12-gauge sheet steel, depending upon the size of the assembly. The panel has a 1½-in. flange all around, with holes punched for easy mounting.

Aluminum finished with a red enamel-

oth wel coated wheel, the Allvent Fan bears th o obtai certified ratings of the National Asso. ensity C ciation of Fan Manufacturers and ar appli American Society of Heating & Venti lating Engineers. ncremen

Lincoln Aircraft Arc Welder

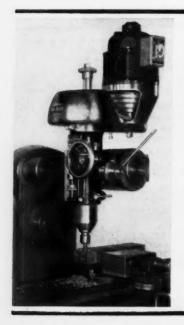
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An arc welding machine designed features particularly for airplane welding is an range a nounced by The Lincoln Electric & Suited for Cleveland, Ohio. The welder join "Planeweld No. 1" and "Planeweld No. 2," two electrodes recently announced by the company for welding SAE-413 and X-4130, chrome-molybdenum steels used in airplane construction.

Most important of the features which adapt the welder specifically for air-craft work is its system of welding cur-rent and voltage control. This feature is of particular importance because it provides for the finely accurate settings which are essential for welding the particular analyses and gauges of metal employed in modern plane construction.

The current control on the aircraft welder is Lincoln's patented "dual continuous control." This system of control permits independent adjustment of



RUSNOK MILLING — DRILLING — BORING ATTACHMENT

Specially designed for heavier duty end mill and boring operations. Uses many types of cutters on a great range of work.

Uses 1/16" to 3/4" end mills. Large size spindle with No. 9 B & S Taper. Quill travel of 4". 1/2 h.p. motor. Six speeds. Easy to mount.

Write for folder

1845 W. Carroll Ave., Chicago, Ill.

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n bears the ooth welding current and voltage so as onal Asso to obtain just the right type and interest and ensity of welding arc for the particular ar application. The control is adjusted to the voltage of the volta accements, thus enabling high weld production, speed and high quality of reld to be obtained.

Also particularly important among the designe features of the welder is the current ling is an range and capacity of the machine. ectric Co. Suited for welding the lighter gauges of



Lincoln Aircraft Arc Welder

aircraft steels, the unit is said to deliver 10 amperes at the arc without ex-The range of the tra attachments. welder also adapts it for heavy materials. High overload capacity is said to enable the welder to withstand sustained operation at the upper portion of its range.

The Lincoln Aircraft Arc Welder is of the motor - generator, single-operator, variable voltage type with laminated pole pieces. Connections are readily accessible for either 220 or 440 volts (also supplied for 550 volts or special voltages), two or three-phase. Occupying less than 4 sq. ft. of floor space, the welder is of arc welded drip-proof con-



struction, and is fitted with four steel feet welded to the base and drilled for bolting the welder in place for stationary installation, or for attaching three-wheeled running gear for portable service.

The aircraft arc welder is available in two models of 150 and 200 - ampere sizes, either portable or stationary. Current range for the 150-ampere model is 10 to 200 amperes and for the 200-ampere model, 10 to 250 amperes.



Forest City Radius Cutting Tools with No. 0 Toolholder

Forest City Radius Cutting Tool

To meet the demand for radius cutting tools, the Forest City Bit & Tool Co., Rockford, Ill., has added to its line a new and inexpensive radius cutting tool, with a newly designed toolholder for the smaller size cutters. The holder, which is designated as the No. 0, will accommodate \$\frac{1}{16}\$, \$\frac{1}{16}\$, \$\frac{1}{16}\$, \$\frac{1}{16}\$, \$\frac{1}{16}\$, and \$\frac{1}{26}\$-in. diameter cutters cutting a radius of

 $\frac{3}{3}$, $\frac{1}{18}$, $\frac{3}{3}$, $\frac{3}{18}$, $\frac{3}{18}$, $\frac{3}{18}$, $\frac{3}{18}$, and $\frac{1}{4}$ in. respectively. Special size cutters can be made to order.

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The cutters are held in position by a hollow hex screw threaded against a flat seat on the shank of the cutter. The cutters are made of high grade high speed steel and are so designed that the radius is said to always remain the same regardless of the number of times sharpened. The ground

A GOOD PRESCRIPTION for Many Production Headaches

THE national defense program has made many new friends for Cerromatrix, the low-temperature-melting alloy that expands slightly on solidifying. For locating punch and die parts, anchoring stationary machine parts, making chuck jaws, and for many other tasks, Cerromatrix makes it possible to catch up with the extraordinary demand that now faces the metal-working industries. Send for our free Cerromatrix Manual describing many ways to use this valuable material.



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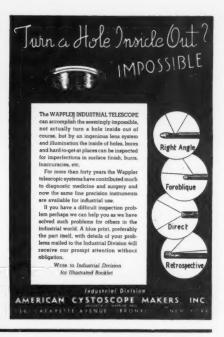
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DANLY MACHINE SPECIALTIES, INC.

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Gives you faster set-ups and greater accuracy. No more tedious or makeshift measuring. Accurately graduated in all planes. Sturdy cradle design and all-steel construction give greater rigidity; permit faster stock removal. Two sizes, priced for every shop. Can be furnished with slotted surface plate for use as universal angle plate. SEND FOR FREE FOLDER.

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| City | | | | |

WESSON CO

ION N. Y. INDON TREAL Ferndale Michigan

face surface of the cutters is parallel with the bottom of the toolholder, a condition which enables the cutters to be quickly and accurately resharpened.

The toolholder is made from a special alloy steel and is designed for use in a lathe or shaper. Size of holder, 1 x 5 x 1/2 inches. The complete set of six cutters and holder with wrench are supplied fitted into a solid wood block to ensure complete protection for the tools at all times.

No. 2 Micro Die Duplicating Brake

Designed for working steel and nonferrous materials, the No. 2 Micro Die Duplicating Brake shown herewith has been placed on the market by the O'Neil-Irwin Mfg. Co., 316 S. 8th Ave., The unit has an Minneapolis, Minn. 8-in. capacity, thereby covering a wider range of work than possible with the 6-in. model previously announced by the company.

The No. 2 Micro Die Duplicating Brake is constructed of heavy machine tool grey iron castings and cold rolled steel and has ample end bearings of

cold rolled steel to cast grey iron. The unit is equipped with precision adjustable stops for accurately duplicating angles, channels, and "vees" to within

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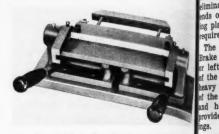
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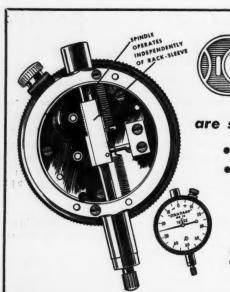
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No. 2 Micro Die Duplicating Brake

a tolerance of 0.001 in. of the duplicated work.

simulta The variable folding plate of the folding The variable rolling plate of impounds brake has full adjustment in both hori-one ha zontal and vertical planes and i erated) equipped with lock screws for ensuring other permanency of settings. Adjustable material length guides are provided for as ing, 11 curately locating working material. The pounds folding plate is of ordinary cold rolle by), 68



HERE is WHY-

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y iron. The steel material and may be drilled, sion adjust apped, or slotted for a precision mate-duplicating fal gage and stops and for forming to with both right and left-hand angles, thereby eliminating the possibility of conflicting ends of materials in folding. The folding plate can be quickly replaced when equired.

The No. 2 Micro Die Duplicating Brake may be arranged for either right r left-hand operation or both handles of the unit operated simultaneously for heavy metal working. All contact parts of the brake are of properly hardened and heat-treated steel. Oil cups are rovided for lubrication of main bear-

Specifications of the No. 2 unit are as follows: maximum folding width, 8 in.; maximum folding capacity full width (steel plate operated with both handles simultaneously), 14 gauge; maximum ate of the folding capacity full width (steel plate, a both horione handle either right or left-hand opes and i erated). Is gauge; heavier gauges of or ensuring other more ductile materials in proportistable matters, and the maximum angle of angular foldied for at ing. 110 deg. of radii; net weight, 60 aterial. The bounds; shipping weight (approximate-cold rolls by), 68 pounds.

"Diamond 40" Hydraulic Press

A utility hydraulic press suitable for a wide variety of work has been intro-duced by the Diamond Machine Co. of Philadelphia, 2447 Aramingo Ave., Philadelphia, Pa. Known as the "Diamond 40," the press can be used for assembling, broaching, straightening, riveting, forcing, and pressing operations. While designed as a general-purpose unit, the press has a satisfactory productive capacity.

The precision machined steel ram is guided, steadied, and prevented from rotating for the full length of its travel by a crosshead riding on four rigid tension rods. The extreme travel and return stroke of the crosshead are limited by adjustable follow-up stops.

The Diamond 40 Hydraulic Press can be operated either by a hand lever or foot pedal, which is pulled forward or depressed respectively for the work stroke and released for the return stroke. The machine has an automatic return stroke, the speed of which is double that of the approach.

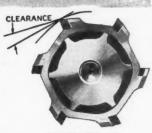
The press is powered by means of a high pressure Hele-Shaw pump. All high pressure piping is extra heavy

REGRINDING YOUR REAMERS AFTER EACH RE-SIZING!

The Staples type Carboloy-tipped reamer eliminates regrinding operations after each resizing because clearance is automatically provided through a patented plug that tilts the blades, presenting in effect, a new cutting edge each time the reamer is expanded. Because of this, Staples reamers may often be expanded several times without a regrind and without affecting the finish of the hole. This enables you to hold accurate sizes with a minimum servicing of the reamer. Staples reamers can be easily adjusted to 1/10,000 of an inch. Sizes range from 1/4" dia. to 11/2" dia. Write for leaflet. Sold through Carboloy Company or direct from—

STAPLES TOOL & ENGINEERING Co.

Cincinnati, Ohio



Carboloy Tips Resizing automatically provides clearance without regrinding |

July, 19 July, 1941



The Carboloy diamond impregnated dresser gives greater diamond usage per carat purchased. You use every particle of diamond throughout a large diamond impregnated matrix. No remounting expense. Try one for your rough, semi-finish and finish grinding wheel dressing jobs. Send for Catalog DR-38.

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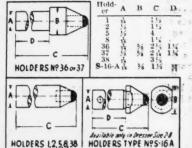
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| Grinding Wheel | | Correct | Price | |
|-------------------------------------|--|-------------------|---------------------------|--|
| Diameter | Width | Dresser | Each | |
| Up to 20" Up to 26" Up to 42" | Up to 1 1/2" Up to 2 1/2" Up to 8" | 2-B 3-C 4-D | \$ 9.60 12.60 15.35 | |

*Mounted Free in Desired Holder. Standard Holders shown below. Special Types when needed. Allow 1 Week—10 days for holders No 37, 38, and S-16-A.



CARBOLOY WHEEL DRESSERS

seamless steel. The oil tank, electric motor, and hydraulic pump with the controls are compactly grouped at it top of the press and covered by streamlined, removable housing. Relievalves in the oil circuit protect against overloading the press with work. The electric motor is protected against over



"Diamond 40" Hydraulic Press

load by an overload relay in the of tractor panel.

Gages for the oil system pressure total pressure of the piston, and delevel, start and stop push buttons, when all conveniently located at the front the press.

The base of the machine is 12 is high and has a 10-in. hole centered a der the ram. A 16-in. V-table is

July, 194

TANNEWITZ DI-SAW SAVES AN AVERAGE OF \$4.80 EACH HOUR IT'S USED



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Inside and outside cuts on dies, shoes, templets and endless other jobs can be done in a small fraction of the time required by former methods. Saws, files and polishes. A highly developed, large capacity machine.

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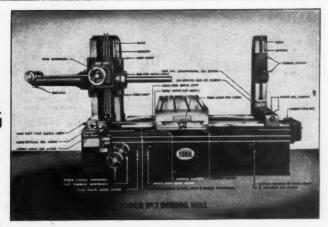
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July, 1941

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MODERN MACHINE SHOP

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nished with the press. Six and 10-in. V-tables and a 12-in. extension table are available as standard accessories.

Total daylight of the press is 4 ft. 6 in. without the V-table, 3 ft. 2 in. with the standard V-table. Diameter of the ram is 4 in.; stroke, 24 in.; maximum tonnage, 40 tons. The overall height of the press is 9 ft. 7% in., and the floor space required is 2 ft. 8 in. x 3 ft. 8 inches.

Electro-Jetal Process

Known as the Electro-Jetal, a process which produces a black rust-proof finish on copper by anodic oxidation is announced by Alrose Chemical Co., Providence, R. I. According to the manufacturer, any metal that can be copper plated can be blackened by this process. After preplating with copper, products are immersed in a special electrolytic oxidizing bath for two to five minutes. The resulting velvety black surface of Electro-Jetal is said to provide an excellent absorptive base for an after-treatment of oil, wax, or lacquer, which gives a non-porous, rust-

equivalent to ordinary proof finish nickel plate.

The Electro-Jetal bath can be opeated at any temperature below the boiling point of water, using ordinary steel containers heated by a steam coll Work can be oxidized on racks, in bulk or in baskets.

Jefferson Five-Tool Tailstock Turret

A rotary turret head accommodating five tools and which can easily an quickly be attached to the spindle of the tailstock of any engine lathe, the Jefferson Five-Tool Tailstock Turn shown in the illustration has been placed on the market by the Jefferson Machine Tool Co., Fourth, Cutter an Sweeney Sts., Cincinnati, Ohio. The turret is rigidly built to withstand the same strain as the tailstock to which it perform is applied. When once attached, each The tu tool of the turret centers automatically when brought into action by means of an indexing plunger. Morse

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The Jefferson Tailstock Turret is spe the tail cially bored to a micrometer fit to the outside diameter of the tailstock spind



Jefferson Five-Tool Tailstock Turret

of the lathe on which it is to be used. The turret can be used for such operations as forming, roughing, boring, finishing, drilling, tapping, and so on, without stopping to change tools while performing any five different operations. The turret can be furnished so as to be interchangeable for use on more than one lathe by using a stud arbor with a Morse taper to fit the tapered hole in the tailstock spindle.

The Jefferson Five-Tool Tailstock

Turret is made in four No. 5 - for small bench lathes; five %-in. holes bored in head to hold five different tools; diameter of turret head, 41/2 in.; shipping weight, 20 lb.; No. 6 - for lathes having tailstock spindles less than 11/2in. outside diameter; five 1in. holes bored in head, giving capacity for five different tools; diameter of turret head, 6 in.; shipping weight, 30 lb.; No. 7-forlathes having tailstock spin-dles from 1½ to 2¼-in. out-side diameter; five 1-in. holes bored in head; diameter

of turret head, 7 in.; shipping weight, 43 lb.; No. 8-for large lathes having tailstock spindles over 21/4 in. and up to 3¼ in. in diameter; five 1¼-in. holes bored in head; diameter of turret head, 8 in.; shipping weight, 56 pounds.

Cleveland Crane End Tie

Designed for heavy-capacity cranes of the type used for power houses and



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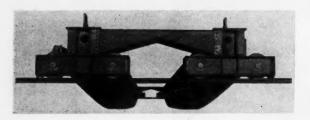
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End Tie of 100-Ton 90-Ft. Span Cleveland Crane

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Towmotor Model LT. 44 Lift Truck

other moderate services requiring eightbridge track wheels, The Cleveland Crane & Engineering Co., 1111 283rd St., Wickliffe, Ohio, has developed a unique crane end tie of extremely simple design.

The tie is made of one heavy rolled steel plate that is first cut to shape and then bent to form a box section. Bending is done "cold" on a Steelweld Bending Press. Into the box section are welded reinforcing diaphragms to provide the required rigidity. This end tie construction is known as a "spring type" since it has sufficient give or spring to permit all wheels to bear properly on the track at all times despite runway irregularities.

The Towmotor Co., 1228 E. 152nd St. Cleveland, Ohio, has introduced the Model LT-44 lift truck shown in the !lustration herewith which is capable of lifting 4,000 lb. at 15 in. from the carriage. The truck has a 44-in. wheel has with a turning radius of only 72 in thus making it ideal for use in over crowded quarters. The overall width the truck is 35 in. and the overall length (without forks) is 74 in. The unit of be equipped with low, medium, and high telescopic lifts up to 132 in., and, in addition to standard load-carrying forks, is also available with interchangeable attachments for special purposes, sud as rams, scoops, flat plates, and special loading devices.

Powered by a 271/2 h.p., four-cylinder

Bridgeport Floor Grinders

These grinders are particularly well adapted for foundry snagging and all kinds of hard, continuous offhand grinding. They embody that rugged strength, durability and ample power which withstands all kinds of service, hard work and abuse, day in and day out. Write for complete catalog.

PUT YOUR HARD JOBS ON A BRIDGEPORT GRINDER



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gas engine with degasser and governor, the Towmotor Model LT-44 Lift Truck travels at speeds from 1 to 10 miles per hour, with two speeds forward and two n reverse obtained by a special transmission having only four gear elements. By means of the hydraulic lifting and filting system, the unit will lift and stack rated loads accurately to heights

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Towmotor Model LT-44 Lift Truck

of 7, 9, and 11 ft. at the rate of approxinately 40 ft. per minute.

The LT-44 is streamlined in appearnce with a rugged, all-steel arc welded rame. Design improvements are as folows: entire motor assembly and batry instantly accessible by river's seat; specially designed transnission case which permits removal of dirventilated clutch plate without disurbing motor or transmission; front driving) axle housing designed as an ntegral part of the frame, thus ensurng proper alignment of drive axle with ransmission and power plant. The unit has a full-width, upholstered

ities. Nickle steel lock screws provide extra strength. Cadmium plated screws prevent rusting. Knurled head allows better grip. Black dome improves appearance, resists rust. Write for data sheet. mun UNIVERSAL FNGINEERING COMPANY FRANKENMUTH - MICHIGAN

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Super-finished bore straight and

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DRILL BUSHINGS

seat located at the center of the machine for increased driver comfort and safety. Controls are located well forward convenient to operator, thereby simplifying operation and providing increased leg room for easy entrance and exit.

Diamond "Philadelphia Type" Face Grinder

Diamond Machine Co. of Philadelphia, 2447 Aramingo Ave., Philadelphia, Pa., announces the development of a face grinder known as the "Philadelphia Type," which is available in two sizes; namely, 30 and 36 in. The chief advantage claimed for the machine is increased speed of production. One of the features of the grinder is centralization of all controls. Every control lever, wheel, push button, instrument dial, and oil filling point is located in one central position within easy reach of the operator.

The bed of the machine is of such a length that even at the extreme limits of travel the platen does not overhang. In addition, the ways are wide apart, thereby assuring a rigid foundation for the table. The platen is also of sufcient width to allow for mounting a magnetic chuck or for grinding with parts.

The table is driven by pistom mounted in double opposed cylinders the rods of which are always in tesion. This arrangement, which is powered by a Hele-Shaw pump; is known as the "Fluid Tension" drive and is said to assure uniform table speed in both directions of travel.

The main spindle of the grinder in driven by V-belts. For concave grinding, the wheel head can be rotated horizontally as much as 15 deg. In host sizes of the grinder, the sectional abusive blocks comprising the grinding wheel are chucked firmly against solid rim. Coolant is directed against the grinding wheel by an improve nozzle, and the wheel is dressed by remotely controlled hydraulic whe truing device, which is adjustable in all positions of the wheel head.

The Diamond Philadelphia Type Far Grinder is said to have ample protection against flying abrasive particle splashing of coolant, and grit entering the ways or motor windings. The bar of both sizes of the grinder occupies



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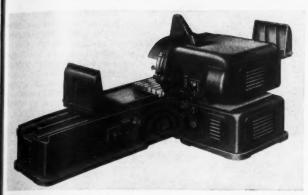
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Diamond "Philadelphia Type" Face Grinder

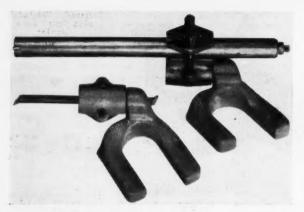
length of work handled by either machine is 84 inches.

space of 229 x 48½ in. Floor space required for either machine is 111 in. front to back, 330 in. end to end, allowing for table clearance. The speed of the 30-in. machine is 530 r.p.m.; 440 r.p.m. for the 36-in. machine. The 30-in. machine accommodates work 17½ in. high with front guard in place or 2½ in. high with grard removed. The 35-in. machine accommodates work 23½ in. high with front guard in place, 29½ in. high with front guard removed. The

Double-Shank Boring Tool Holder

Illustrated here is a two-shank boring tool holder which has been placed on the market by Rapids Production Tool Company, Wisconsin Rapids, Wis. Features of this tool are the unusually rigid shank and the method of holding the bar. The shank is so designed that, instead of being clamped in the toolpost, it fits around the toolpost and is locked





Rapids Double-Shank Adjustable Height Boring Tool Holder

boring bar from % to 11/2-in. diameter can be clamped in the bracket The bracket can also be used to hold a small motor for inside or outside grinding.

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The bracket is adjustable for height and by revolving it on its shank it can be set at five different heights as required on the lathe, shaper, or planer.

Johnson Pre-Cast Bearing Bronze on Steel

in position by clamping a tool or tool holder crosswise in the toolpost. This design provides an unusual amount of rigidity. The method of holding the boring bar is such that a perfectly straight bar without shank is used and the bar can quickly and easily be set in any desired position. Any size of

An unusual bearing material to be known as Pre-Cast Bearing Bronze on Steel has been placed on the market by the Johnson Bronze Co., 590 S. Mill St., New Castle, Pa. Pre-Cast Bearing Bronze on Steel is essentially a thin wall, laminated type of bearing that is said to combine the bearing qualities

Aircraft Steels

We can supply immediately from stock, hot rolled or cold drawn in all sizes, Aircraft quality electric furnace SAE 2330, x4140 and x4340 alloy steel. This steel is subject to the Magniflux test and conforms to Army and Navy specifications. Send for folder describing analysis, physical properties, uses, heat-treating suggestions, etc.



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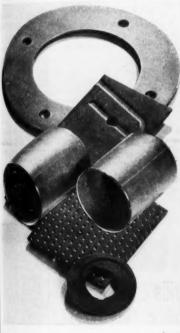
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To manufacture. S.A.E. 64—copper 80 per cent. tin 10 per cent, lead 10 per cent—is first employed. This alloy is said to combine in the correct proportion all the necessary elements to ensure the utmost in bearing performance. By casting the alloy in solid bronze bars, the metals unite chemically and



Johnson Pre-Cast Bearing Bronze on Steel

form a definite copper-tin eutectic with the lead trapped in the interstices. Thus, the grain structure of the alloy, and the resulting bearings, is definitely established.

Next, the center of each casting is removed by drilling. The borings thus obtained are reduced to a powder treated in a hydrogen furnace to remove all oxides, and then firmly bonded to strip steel. The process of manufacturing bearings from bronze on steel in strip form, is the same as for any type of sheet metal bearing, being essentially a stamping and forming operation.

Features of Johnson Pre-Cast Bear-



ing Bronze on Steel include high Brinell hardness, great resistance to pounding and shock, plus a comparatively low coefficient of friction. In addition, the high ratio of tin to copper plus the great percentage of lead provides smooth, quiet operation and long bearing life.

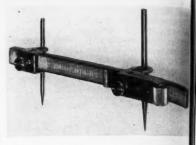
Johnson Pre-Cast Bearing Bronze on Steel is also available as a graphited bearing and can be furnished, either plain or graphited, as finished bearings, washers, strips, or in rolls up to 400 ft.

in length.

Bartusch "Gear Beam" Compass

An all-metal "Gear Beam" compass with unique rack and gear control is announced by A. P. Bartusch, 775 Walnut St., Lockport, N. Y. Designed for use by mechanics or craftsmen who require a most accurate and sturdy instrument for layout work on metal or other material, the compass is furnished complete with a hardened steel scriber; however, other tools, such as a knife, glass cutter, or pencil, can also be employed in the unit.

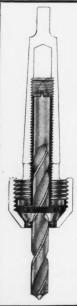
The roller device which holds the



Bartusch "Gear Beam" Compass

scriber has a gear-like roller which in constant engagement with the rad-like beam. To set the compass to the desired radius, the geared roller is simply propelled along the beam by mean of the thumb. In this manner, all at justments can be made and the compasset to as close as 1/100 of an inch. Due to the positive rack and gear actinal slippage is said to be eliminated.

A thumbscrew is provided in the rolls device and may be used to lock the sposition of the compass. Such lockin is usually required when scribing on



THE PARK CHUCK

Holds Full Length Drills . . . Short Cut-off Drills or Broken Drill Ends

Only major improvement in chucks in 40 years. No jaws—no keys—locks and unlocks by hand. No slipping or scoring of drill shanks. Short drill ends retain full use of cutting end where web is thin and easy to sharpen. Insurance against coming drill shortage. Ideal for drill presses, single or multiple, turrets and screw machines. In Morse tapers and straight shanks—in drill capacities from 3/32" in various steps and sizes up to $2\frac{1}{2}$ ".

Write for complete details.

R. H. PARK MANUFACTURING CO.
1720 EXCHANGE BLDG. SEATTLE, WASHINGTON



CENTERLESS GRINDING

ACCURACY—PROMPT SERVICE

Commercial Centerless Grinding Co. 603 CEDAR AVENUE, CLEVELAND, OHIO

TRICO OILERS

SAVE TIME - OIL - WORRY



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No guesswork — bearing failures—waste—idle machine time — oil - soaked motor windings — fire and accident hazards, when you use TRICO OILERS. Glass or unbreakable styles for every application.

WRITE FOR BULLETINS

TRICO FUSE MFG. CO. Milwaukee Wisconsin

OTC GRIPOMATIC PULLERS

CUT PRODUCTION DELAYS

Conserve time and man power, reduce accidents — with OTC GRIPOMATIC PULLERS. Automatic grip prevents slipping. Capacities 5 to 50 tons.

OTC PULLING SYSTEM

Includes Pushers and Pullers to install or remove gears, bearings, wheels, pulleys, sleeves, shafts, etc. Write for Plant Maintenance Bulletin.

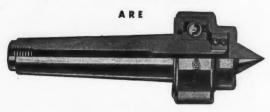




OWATONNA TOOL CO.

STURDIMATIC HEAVY

LIVE CENTERS



AUTOMATICALLY COMPENSATED FOR EXPANSION, SHOCK AND WEAR ARE ACCURATE, DURABLE

WRITE FOR CATALOG AND FREE TRIAL OFFER

STURDIMATIC TOOL COMPANY

5222 THIRD AVE.

DETROIT, MICH.

NGTON

rough surface or when great side pressure is to be exerted on the scriber.

For durability and lightness, the beam is made from hard aluminum alloy tubing and anodized to a satin finish. Holder parts are of nickel steel. The smallest radius that can be set with the Bartusch Gear Beam Compass is 1½ in., and the maximum radius available is 2 in. shorter than the beam length. For radii over 34 in., beam connectors are used.

Elgin Electric Brazing Torch

An electric brazing torch for use in connection with an a.c. electric welder is now being marketed by Borm Mfg. Co., Elgin, Ill., under the trade name of "Elgin." The torch can be readily adapted to a welder by simply connecting the cables of the torch to the electrode holder and ground cable of the welder.

The purpose of the Elgin Electric Brazing Torch is to obtain a proper arc and flame through the use of cored carbons. The arc is drawn between the two carbons by bringing them into contact with each other and then separating them at the proper distance to pro-

duce the required flame for efficient welding. The Elgin Torch is constructed so that the proper flame is



Elgin Electric Brazing Torch

and

automatically obtained. The desired welding flame is governed by the size of carbon used and the various stages of the amperage changes of the a.c. electric welder.

Features of the Elgin Torch include remote control release of the carbon from their holders. This feature allow for ready replacement or adjustment of the carbons without interrupting work additional adjustment of carbons is made by means of two thumb adjusting screws. The adjustable carbon is the screws.

JOIN THIS PROFITABLE UPLIFT MOVEMENT



There's a great "lift" in finding new storage space to save the cost of building. Service Lifters "enlarge" crowded storage space. Go where wanted on Service easy rolling casters. When spotted they lift or lower, mechanically or electrically. Model at right rises to 11 feet and over; capacity 750 lbs. Can be built to order. Write for illustrated description of models.



Piling boxed electric ranges 3 high

SERVICE PORTABLE LIFTERS

Service Caster & Trick 1
596 N. Brownsweed An
ALBION, MICH.

Eastern Factory: 412 Serville Ave., Somerville (Basta Mass. • Toronto, Communited Steel Corporation, United Steel Corporation, U.S. C. & T. Co. Division Pullmo

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GRAY TURRET HEAD METAL CUTTER OR NIBBLER

GRAY, Originator of First Practical Metal Cutter or Nibbler

Most modern Nibbler for Template Cutting, Tool Rooms, Shipbuilding, Aircraft Parts, Aircraft Tubing, Sheet and Plate Shops.

GRAY MACHINE CO. Box 596, Philadelphia, Pa.

SAW FILING and GRINDING MACHINERY and MACHINE TOOL FIXTURES



Industrial Engineering Co., Inc.

311 Sixth Ave. 5. P. O. Box 433 MINNEAPOLIS, MINNESOTA

GUARANTEED FOR

When you purchase a STEEGE Drive for your lathe, shaper, miller, etc., you are protected by our broad 5-year guarantee. STEEGE Drives are easily installed—prices \$35.00 up—sent on 30 days' approval.

Let us send catalog.



L. STEEGE MACHINERY CO. (Our 23rd Year) 550 W. MONROE ST. . CHICAGO, ILL.

Rockford LMC Clutch

PLICATIONS Up To

DESIGNERS and manufacturers of products driven by 6 h.p. engines, or smaller, find many desirable features and advantages in the new Rockford LMC Clutch. It is compact, powerful, easily operated, durable; readily put into product designs; easily installed and adjusted to operating conditions. Simple structure, high-grade materials and precision manufacturing make this toggle-type Rockford Clutch an amazing value, reliable in all types of service, a powerful aid in selling, highly satisfactory in operation. For details and dimensions, write for Bulletin LMC 413... Complete information about the other Rockford Clutches listed below will also be supplied promptly on request.

Rockford Drilling Machine Division Borg-Warner Corporation 300 Catherine Street, Rockford. Illinois, U.S.A.

Pallmore Multiple-Disc Clutches ▼ Over-Center and Spring-Loaded Clutches ▼ Power Take-Offs















Process Machingry Farm Implements Materials flandling

holders enable the torch to be operated in "hard-to-reach" places and are designed for use with carbons of 1/4 to 3/8 in. in size. The holders are especially constructed to eliminate the use of carbon adapters.

The Elgin Electric Brazing Torch is operated by simply pressing the handy adjustable trigger which automatically engages the carbon; release of the trigger places the torch in operation. The torch is fully insulated and simply constructed of quality material. Designed for continuous operation, the torch has a total weight of less than 2 lb., thereby making it easy to handle, and is furnished complete with detachable leads and set of ¼, f₆, and %-in. carbons.

Williams Midget Reversible Ratchet Wrench

J. H. Williams & Co., 225 Lafayette St., New York, N. Y., has added to its line of "Superratchet" wrenches the midget reversible ratchet wrench shown in the illustration. The wrench, which has a 1/4-in. square drive, is 41/2 in. long and incorporates a patented doubletooth pawl for both "on" and "off" m tation. A convenient shift lever at the



Williams Midget Reversible Ratchet Wrench

head instantly reverses the wrench ac-

The handle of the Williams Midgel Reversible Ratchet Wrench is dropforged from high tensile carbon steel and all working parts are machined chrome-molybdenum steel and heat-treated. The wrench is finished in chrome plate over nickel.

Dayton Rogers Model CCC Pneumatic Die Cushion

The Dayton Rogers Mfg. Co., 230 13th Ave. S., Dept. B, Minneapolis Minn., is now producing a pneumatic die cushion to be known as the Model

New Convenient **Drill Grinding** Combination

The Sellers Model 1G Drill Grinder will grind drills from No. 70 (.028") to ½" and produces accurate drill points of 160 to 65 degrees included angle -perfect drill points with equal identical lips. Speeds production. Saves skilled labor for production machine work. Saves drills. Write for catalog and prices.

The cabinet has a working space 13" wide by 30" long and of wood (to avoid defacing tools) with a hinged door and

stands 31" from the floor. It is of heavy sheet steel, rigidly constructed and braced to form a vibrationless mount for the grinder. There are three shelves fastener. Finish is standard machine tool gray. Weight 175 lbs.



WM. SELLERS & CO., INC., 1614 Hamilton St., PHILADELPHIA, PA.

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MODERN MACHINE SHOP

July, 194 July, 194

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CCC. The cushion is furnished in double tandem units and is primarily designed for extremely heavy ring holding pressure on large double-throw, single-crank presses and is used also on explacerank, double-throw presses.

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CC., 2830 inneapolis, pneumatic the Model double-crank, double-throw presses.

The Model CCC cushion is supplied with a combination regulating valve and pressure gage that controls and regulates all working draw ring holding pressures. The design of the cylinder



Dayton Rogers Model CCC Pneumatic Die Cushion

section of the cushion automatically shields the working parts of the cushion cylinders so that no pierce slugs or lose parts can come in contact with the cushion unit. For the larger tandem cushions, a pit is usually provided on the larger presses, and the cushion equipment is supplied complete with a remote centralized lubricating block or header. This centralized lubricating block is furnished with leads to carry the lubricant to the desired location on the individual cushion cylinders.

The Dayton Rogers Model CCC Pneumatic Die Cushion has a ring holding pressure of from 25 to 100 tons which is controlled by the automatic reducing regulating valve furnished with the cushion.

Especially adaptable for use in aircraft, automobile and accessory plants.

NO CHATTER NO BREAKING OF CUTTERS NO DAMAGED WORK



FORMING

For a wide range of work on lathes, shapers and screw machines. No tearing.



CUTTING-OFF

Spring feature allows faster feed with heavier cut. Cutter life is tripled.



THREADING

Threads close to a shoulder. Produces smooth, accurate threads.

Write for further information

AUTO ORDNANCE CORP.

1437 RAILROAD AVE., BRIDGEPORT, CONN.



DoAll Job Selector

DoAll Job Selector

With the increasing demand for speed in production covering thousands of materials, the DoAll Job Selector shown herewith, product of Continental Machines, Inc., 1306 S. Washington Ave., Minneapolis, Minn., has been incorporated on all DoAll Contour Sawing, Filing, and Polishing Machines. The job selector provides a ready reference to all basic materials which are to be contour sawed or filed.

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The DoAll Job Selector contains 56 basic materials ranging from ferrous to non-ferrous materials. A slip of the DoAll operator's hand brings to his eye at a glance the correct sawing speed, saw pitch, saw temper, and saw set, thus enabling the operator to obtain the most economical performance from the DoAll machine. The same information is given when the DoAll is used as a Illing machine.

Additional items contained on the DoAll Job Selector cover oiling directions for the DoAll machine and the minimum width of saw to use in cutting contours of various radii.

Cardboard replicas of the Selector are available to DoAll users, students, and N. Y. A. programs upon request.

"Klampacto" "C" Clamp

Knu-Vise, Inc., 16841 Hamilton Ave., Detroit, Mich., announces the "Klampacto," an improved model toggle ac-



PRODUCTO Modern Machine Vises

With Hardened and Ground Working Surfaces



Semi-steel cast base reinforced with hardened and ground wearing plates which makes vises practically indestructible. Extra large capacity. Front and rear jaw adjustable on hardened working surfaces. Special means to secure locking on rear jaw. Heavy Acme Thread Screws.

Prices no higher than old style cast iron vises. Get the best to insure safety, accuracy and long life.

Also Producto Cam Lock Vises for production milling.

Write for Bulletin No. 35

THE PRODUCTO MACHINE CO



990 Housatonic Ave., BRIDGEPORT, CONN. 3017 Medbury Ave., DETROIT, MICHIGAN

Manufacturers and Distributors of Producto Die Sels, Die Makers' Accessories, Dickerman Automatic Press Feeds. ng, Fil-The job ence to be con-

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Distribu-Die Sets, pries, Dicess Feeds.

July, 1941 July, 1941

REID Surface Plates

11"x15" 12"x18"
18"x24" 24"x24"
24"x36"
Properly Heat
Treated, Thoroughly Seasoned. Write for
Complete Price



Some Territories still open for dealers.

Tool Engineering Service Co., Inc. 243 Washington Ave. Nutley, N. J.

QUICK and ACCURATE



FLYNN MANUFACTURING CO.

437 Bates St. • Detroit, Mich.

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PROFITABLE INVESTMENT

BUILT BY

General Engineering & Mfg. Co.

ST. LOUIS

MISSOURI

JUST THE MACHINE FOR SHELL WORK! The "27" Morey Hydraulic Semi-Automatic Heavy Duty Lathe



Put your shell operations on this fast powerful lathe and turn out your work

powerful latine and turn out your work at top speed.

The Morey "27" is built for long, hard service and will produce at maximum feed and speed up to the limit of tool capacity. Take advantage of the fast, heavy duty manufacturing assured by this machine to reduce cutting time and turn out accurate work. Easy loading from conveyor takes only five seconds. Multiple tool holders can be supplied at front and rear; a turret mounted on separate saddle can be used instead of tailstock.

Full use of carbide tools can be taken by this heavy duty lathe.

ASK FOR... details on MOREY "27" SEMI-AUTOMATIC LATHE for rough turning 155 mm shells at maximum feed—Circular No. 715.

MOREY MACHINERY CO., INC.

tion "C" clamp. The Klampacto is designed for use in the erecting shed, shipyard, roundhouse, or workshop, combining the deep throat of the standard clamp with the tremendous holding pressure of a toggle movement. The lower jaw swings clear of the work when released.

The clamp is equipped with two handles; therefore it is unnecessary to hold onto the clamp and work when tixing it into position because a squeeze of the hand applies the clamp with 2,000-lb. pressure. The clamp is furnished with a threaded spindle and lock

nut, or patented Kam-Lock adjusting rod to avoid spatter when arc welding. The Klampacto "C" Clamp is avail-

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"Klampacto" "C" Clamp

able in three models with a 5, 6, or 11 in. jaw. The clamp is hardened and tempered and has an enamel finish.

234 SIZES

FOR SPRING DATA SHEET

SPRINGS



Compression Type
HARDWARE PRODUCTS CO.
105 Richmond St. Boston, Mass.



New WTTCo Diamond Impregnated WHEEL DRESSER

Whole, unbroken diamonds of high quality and extreme toughness are spaced regularly throughout the matrix to give great accuracy, uniform dressings and to hold wheel to size. These stones are anchored permanently in their matrix by strong chemical bonds that will not break under heat, pressure or rough abuse. No remounting! Lowered production costs!

Send for literature and prices.

WHEEL TRUEING TOOL CO., INC. 3200 W. Davison . Detroit

In Canada: 575 Langlois, Windsor, Ont.

Willard Spring Toolholders

A line of spring toolholders designated as "Willard" is now being marketed by Auto Ordnance Corp., 187
Railroad Ave., Bridgeport, Conn. Thine includes four types of toolholders namely, cutting-off, forming, threading and threading and forming. According to the manufacturer, the holders eliminate breakage of cutters, chatter, and tearing of the work.

The cutting-off toolholder, which due to the spring feature, is said to make possible an unusually fast feed with heavy cut, is made in both a right-had straight and right-hand offset type, which is furnished complete with hardest wrench and one high speed cutter. The right-hand straight holder is available in sizes of ½ x 1 x 6 in., ½ x 1½ x 6



For Machine and Tool Work and Quick Set-Up

The only 3-way reading precision indicator. As curate in either direction. Feeler mounted in on tered cone bearings. 014 reading. Price \$5.00 Plus Postage. Write for folder.

J. R. REICH MFG. CO. 45 E. Stroop Rd. Daylon, Oli

July, 194 July, 1941

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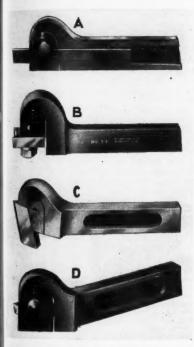
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Price \$5.00

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The forming toolholder is particularly shapted to a wide range of work in the lathe, shaper, and screw machine, and is supplied complete with one high



(A) Cutting-Off Toolholder, (B) Forming Toolholder, (C) Threading Toolholder (D) Threading and Forming Toolholder

The threading toolholder is especially designed for threading close to a shoulder, producing smooth accurate threads. Available in both straight and right-hand offset types, it is supplied in one size of ½ x 1½ x 6¾ in. and is furnished complete with hardened wrench and one single point sharp V-thread cutter.

JEFFERSON TOOLS INCREASE PRODUCTION ON ENGINE LATHES



This Turret attachment automatically centers 5 tools when brought into play. It will convert your engine lathe into a turret lathe in 15 seconds. Made in 4 sizes.



This new modern tool post turret has been designed to increase production on engine lathes. It is made in two sizes, and can be easily mounted on cross slide or compound rest. It has a capacity of 4 standard tool holders which can be easily inserted and rigidly held.

Write for Bulletin describing these Jefferson Precision made tools.

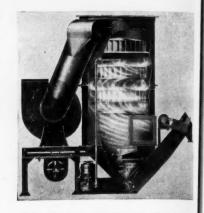
JEFFERSON MACHINE TOOL CO.

The threading and forming toolholder can be used for fine or coarse threading and is said to produce excellent results when adapted to forming operations. Of the right-hand offset type, the holder is available in sizes of 1/2 x 1 x 61/2 in., 1/2 x 11/8 x 61/4 in., and 1/2 x 11/8 x 61/4 in. with cutters of ¼-in. square, \(\hat{n}\)-in. square, \(\hat{n}\)-in. square respectively. The holder is furnished complete with hardened wrench and one high speed cutter.

Schneible Type "UC" Unit **Dust Collector**

The Claude B. Schneible Co., 3951 Lawrence Ave., Chicago, Ill., is announcing a unit dust collector in 2,000 to 10,000 c.f.m. capacities. Designated as the Type "UC," the collector consists of a fan, five-spray curtain tower, pump, settling chamber, and sludge ejector-conveyor. The collector tower is of conventional Multi-Wash design employing water in a cyclonic wash action to absorb dust and fumes on impingement plates and vanes.

In operation, heavy particles are pre-cipitated in the lower inlet cone of the



Schneible Type "UC" Unit Dust Collector

collector, fines being collected and washed back into the sludge chamber by the downward moving water spray

The Schneible Type "UC" Unit Dust Collector has no moving parts. The sludge ejector-conveyor operating at slow speed removes sludge from the

SMALL GEARS -in the finer Pitches-14 to 96 D. P.

SPURS WORM-SPIRALS GEARING **HELICALS RACKS** BEVELS RATCHETS

High precision or commercial production.

A few pieces or a million.

You can SAPELY entrust your Gear purchases to this exceptionally well equipped and organised plant.

Made to Order Only-No stock-No Catalog

Gear Specialties

2620 W. Medill Ave. Phone - Humboldt 3482 A GO

STEELGRIP (applied with a hammer) clinche into a smooth flexible joint compresses bell end. Double rocker pin Wiregrip take up wear. Write for Belt Hocks catalog. have patented blue aligning cards that hold hooks in exact position—assure uniform tension, and prevent card end waste - every ARMSTRONG-BRAY & CO. 'The Belt Lacing People' . 303 N. Loomis St., Chin

A better Flexible Coupling for COUPLINGS

> All sizes — all non-lubricated. Low cost maintenance.

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MODERN MACHINE SHOP

July, 1941

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precipitation chamber, dewaters it in the conveyor, and discharges it into any convenient receptacle. The collector occupies a minimum of floor space and is said to require a negligible amount of maintenance.

New Method "Automatic" Marking Tool with Interchangeable Letters

Designed for rapidly and automatically marking cylindrical parts in production, including shell and other ordinance units, indexed dials, rolls, and so on, New Method Steel Stamps, Inc., 149 Jos. Campau, Detroit, Mich., is now manufacturing a rotary or roll-type marking device in which the letters or figures are interchangeable. Numerous installations on automatic screw machines and turret lathes have demonstrated the ability of the tool to automatically make clean-cut identifying marks in high production.

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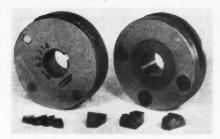
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July, 1941

The die is mounted in a holder which has a fine adjustment for starting the marking operation when the marking



New Method "Automatic" Marking Tool with Interchangeable Letters

tool is brought into contact with the work. After completing the marking operation, the roll is returned to initial position by a coiled spring mounted on the end of the roll shaft to which the die is keyed. The roll is so designed that continuous contact with the part after marking does not cause it to rotate and re-mark the surface. Thus, only a single impression is made even though the part continues to rotate before the roll is withdrawn from contact. A special design feature of the New

Method "Automatic" Marking Tool is a

HOPPERS MOTORIZED HOPPER UNITS

Adaptable to Presses, Thread Rolling and Slotting Machines, Centerless Grinders and Special Machines.

Hoppers will feed Rivets, Nuts, Screws, Pins, Plain Washers and Special Parts Adaptable to Hopper.

SEND SAMPLES

Detroit Power Screwdriver Co. 5375 ROHNS AVE., DETROIT, MICH.



means for firmly holding in position all the individual type letters or figures even when marking hard materials. Any slight movement of the type which might cause blurring or inaccurate marking is thereby said to be eliminated. When type and spacers do not completely occupy the full opening, a movable locking device takes up the remaining open space.

Various forms of holders are available so that the device can be adapted to most applications where the marking of rotating parts in production is required. Any words, letters, or figures can be supplied within the circumferential range provided in the die. Marking rolls with solid dies and fixed lettering are also available for use in the same type holder as used for the die with interchangeable letters.

"Brightboy" Half Round Tablet

Designed to speed the finishing and polishing of curved metal surfaces, the "Brightboy" Half Round Tablet shown in the illustration has been developed by the Weldon Roberts Rubber Co.,

Brightboy Division, 6th Ave. and N. 13th St., Newark, N. J. The tablet is made in the same compound as the other Brightboy products; namely, a soft rubber binder which

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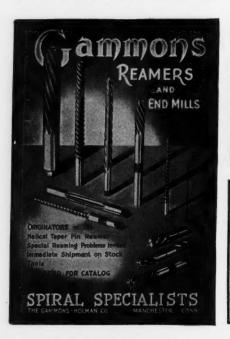
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section and both inner and outer surfaces may be used, the inner surface being corrugated for faster action.

Almost as pliable as a rubber erase the Brightboy Half Round Tablet my





By a Quick, Easy, Inexpensive Methol Your business letterhead will bring literatur. WATTS BROS. TOOL WORKS WILMERDING, PA.

GEARS Good Gears Only

All Kinds
Any Quantity
AT THE RIGHT PRICE

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be compressed by the hand to conform to the diameter of tubing or shafting, or it may be squeezed into the hollow of tubes, bushings, or flanges. It is said to finish and polish such surfaces quickly and effectively.

Dayton Rogers Model GT Pneumatic Counterbalance Cylinder

The Dayton Rogers Mfg. Co., 2830 S. 13th Ave., Dept. B, Minneapolis, Minn., Model GT pneumatic announces a

counterbalance cylinder for large, straightside punch press equipment. The cylinder operates direct from the air line system and serves to counterbalance the large rams on the larger straight - side presses, compensating for the increase or decrease in the size of the die tooling equip-ment fastened to the press ram. The counterbalance compensator is regulated by a combination regulator and air pressure gage furnished with each set of counterbalance cylinders.

The Model GT counterbalance cylinder can be installed in groups of two, four, or six, and automatically takes up the lost motion due to the wear of parts and the large clutch mechanisms. By the use of the cylinder, a press operating with clutch jam may be operated without the use of the retarding

brake or with only slight friction on the brake itself, since the counterbalance cylinder is designed to give the required retarding controlled action. The cylinder is made in diameters of from 6 to 14 in. having strokes of from 12 to 24 in. Both the steel polished cylinder and piston stem are hard chrome plated to prevent rusting and pitting.

ARBIDES



Dayton Rogers Model GT Pneu-matic Counterbalance Cylinder



THE ORIGINAL Etchograph

Mark tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides-quickly-plainly.

Three sizes to meet all requirements. Also a combined Etchograph and Demagnetizer.

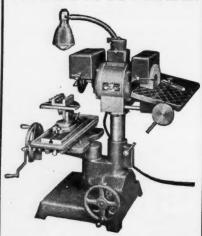
Weite for circulars and prices.



Warren Portable Carriage for Light Machines

Warren Steel Specialties Corp., 106 Niles Ave., Warren, Ohio, has developed a portable carriage to reduce production inefficiency resulting from time losses incurred while work in process is moved considerable distances within a plant to motors, tools, and light machines, for subsequent operations. The carriage is designed to enable workmen to wheel awkward-to-handle, heavy, and light weight but hitherto stationary

CARBIDE TOOL GRINDER



The Knock - Out Carbide Tool Grinder is designed for the complete maintenance of cemented carbide tipped tools.

(Pin this to your letterhead and send it to us; we'll do the rest!)

Please send us your bulletin CTG40-7M with full details and prices on your Carbide Tool Grinder.

K. O. LEE COMPANY Aberdeen, South Dakota



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July, 1941

Warren Portable Carriage for Moving Light Machines to the Job

machines direct to the job rather than carrying the work back and forth through tool rooms or the factory. The carriage is constructed of angle iron channel, and heavy gauge auto body sheets welded together. The carriage is equipped with handles so that the workmen, without helpers, can lift and guide the apparatus direct to their bench or job where it will then remain station-

The carriage is available in any practical size, and is said to be ideal in crowded factories and also in plants where more than one man uses the



GEAR CO. DETROIT 8130 Jos. Campau Ave. . Detroit, Michiga

same tool or machines at different intervals. Loaded with necessary equipment, the carriage is practical and useful on construction jobs. The designer's purpose is to fabricate the carriage to suit the individual needs of equipment manufacturers.

Despatch CF Tempering and Drawing Furnace

The illustration shows the Despatch CF Tempering and Drawing Furnace now being built by the Despatch Oven



Despatch CF Tempering and Drawing Furnace

Co., Minneapolis, Minn. According to the manufacturer, this furnace is an outstanding improvement over the older CF furnaces and is therefore more adaptable to toolroom tempering and drawing work, heat treatment of aluminum rivets and other aluminum alloy castings and parts, preheating of aluminum billets before forging, heat treatment of magnesium alloy castings, and general production work requiring a



PILOT BUSHINGS Frictionless

—Rotary
For core drilling, T.
C. and high speed
boring, turret tool
piloting, etc. Won't
stick or clog. Dust
proof as a wath.
Write for details.

GIERN & ANHOLTT TOOL CO.
1312 Mt. Elliott Ave. Detroit, Mich.

KOCH TEST INDICATOR



THE ONLY INDICATOR ON THE MARKET HAVING WORKING ENDS, for inside and outside test. Torsion spring and compression spring assure positive and sustained accuracy. 1/1000" graduations. Rugged, accurate, convenient. Write for details.

DEALERS WANTED

ANDREW GENALES NYACK, NEW YORK



HOW TO SAVE MONEY ON HACK SAW BLADES

The new STAR Unbreakable Special Flexible Blade costs no more than ordinary tungsten blades, yet each supply you buy will last longer — for three reasons:

 This blade is so flexible that it is guaranteed unbreakable in

use in a frame. (In many shops, more blades break than wear out.)

2. In spite of its flexibility, this blade cuts like an "cll hard"—far longer and far faster than any other flexible

blade you can buy.

3. New steel and heat treatment eliminate tooth strippage, even on the

toughest jobs.

Make a note now to specify STAR Unbreakable Special Flexibles on your next order for all-purpose hand blades—the blades with the all-over green metallic

finish (patented), with clear, Complete identification stamped on every blade. STAR Blades are made in Hand and Power types—of Tungsten, "Moly" and High Speed Steel. All STAR Hand Blades are packed in modern metal boxes.

CLEMSON BROS., INC. Middletown, N. Y.



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MODERN MACHINE SHOP

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July, 1941

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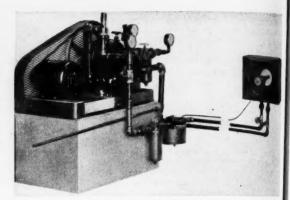
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temperature range from 300 to 1,200 deg. F.

The body construction of the furnace has been made very much heavier and heavy duty lift doors have replaced former swing type doors. Fan capacities have been increased and the method of interior heat distribution and circulation has been modified to give better uniformity than formerly assured.

Standard furnaces in the improved CF line range from 13 x 13 x 13 in. to 37 x 37 x 25 in. Special sizes can be furnished on order. The improved CF furnaces are available with either gas fired or electric heating systems.



Leiman Oil Burning Multiple Units

Leiman Oil Burning Multiple Units

Oil burning and the operation of a large number of burners throughout a



SAROSTON Lathe Grinder

A Sturdy Tool for Precision or Production Grinding.

Use wheels on either end of the spindle.
SIZES UP TO 2 H.P.

THE SAROSTON CO. 251 PARK ST. UPPER MONTCLAIR N. J.

"ALNOR" Velometer



An All Purpose Air Velocity Meter--Instantaneous, Direct Reading. Measures total and static pressures as well as velo-

Write for catalog.

ILLINOIS Testing Laboratories, Inc. 153 W. Austin, Chicago

factory or manufacturing plant is said to be made more economical and simplyfied by the use of the oil burning multiple units now being offered by Leiman Bros., 111-8 Christie St., Newark, N. J. With one air and oil motor-driven pump set installed, any number of burner nozzles may be operated simultaneously or on and off as the service of each individual nozzle may require. For example, there may be one or more nozzles used for the heating boiler, another for the power boiler, and several stations throughout the plant for firing industrial operations such as melting, annealing, or various types of heating One installation is said to take care of all nozzles or any parts that may require continuous or alternative operation.

By means of a single motor-drive air and oil pump set, as many individual nozzle stations as necessary may be serviced. These pump sets are designed to efficiently handle any grade of fuel oil and are said to be especially effective with the heavier and cheaper grade of oils. They operate at slow speeds hence are extremely quiet in use.

Golconda "Polypoint" Diamond

Equipped with small, whole diamond which are said to remain sharp, a line of "Polypoint" tools for wheel truing and dressing is announced by Golcond Diamond Products Corp., 2212-16 Armi-

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tage Ave., Chicago, Ill. The tools are made with four different sizes of diamonds and are said to fill every re-



Golconda "Polypoint" Diamond Tool

quirement of dressing or truing grinding wheels up to 36 in. in diameter and 6 in. in width.

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According to the manufacturer, the Polypoint tool requires no resetting. Correct tilting of the tool is said to continuously bring new cutting edges into service. A special matrix alloy holds the diamonds firmly in place until they are completely used, the matrix wearing away as the diamonds become exhausted.

The three-stone "all-in-line" horizontal working position against the wheel enables all three diamonds of the tool to work simultaneously. This arrangement is said to give the tool the benefit of group resistance to wear, thereby assuring long life and better gage maintenance over the entire face of the wheel. According to the manufacturer, the correct size of Polypoint tool will hold size across any width of wheel, thus ensuring a straight face without taner.

Gale Cutting Oil and Coolant Interceptor and Separator

To make possible a saving in cutting oil and an increase in the efficiency of automatic machines upon which such oil is used, a cutting oil and coolant interceptor and separator has been developed by Gale Oil Separator Company, Inc., Chrysler Bldg., New York, N. Y.

The unit is so designed that when the cutting oil or coolant flows into it, the mixture of grindings, metal particles and oil is directed downward into the interceptor where it is broken up by a



BUY

WHITNEY - JENSEN BRAKES

FOR LONG LIFE AND ACCURACY

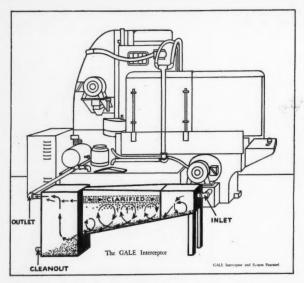
ROLLER BEARING. Improved design is 40% faster and 20% easier on the operator. Hardened Jaws for stainless steel. Cembination type for plain or box and pan bending.

WHITNEY METAL TOOL CO.

110 Forbes Street

Rockford, Illinois





Drawing Showing Method of Installing Gale Interceptor to Remove Residue from Coolant

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The Gale Interceptor can be used to replace settling tanks, or the outlet from the interceptor can be directed into the existing pump section in the automatic machine. Little time is required for installation.

The interceptor operates entirely by gravity, having no moving parts. It can be installed with or without a filter element, as required. It is very easy to clean as the liquid can flow out, by gravity, through a convenient clean out pipe.

Pump repairs are eliminated as only clarified liquid goes through it. Lubricating oil in the coolant is intercepted with no possibility of it flowing back. The interceptor can be built in sizes of five gallons per minute or more.

specially designed breaker wedge. The breaker wedge accomplishes three functions; it slows the incoming liquid, directs the lighter cutting oil or coolant upward to the surface, and directs the heavier materials downward toward the bottom of the interceptor. Surplus particles are permitted to settle out to the bottom of the interceptor.

The heavier material is riffled and rolled, breaking away the lighter oil, which naturally flows to the surface free of foreign material. The heavier material flows into a bucket which is easily removed so that the residue can be dumped and the bucket replaced in a few minutes. The lighter liquid on the surface flows to the outlet and into a compartment where the final clarify-

New Books

Machine Trades Blueprint Reading. By Russel W. Inhe and Walter E. Streeter. Published by American Technical Society, Drexel Ave. at 58th St., Chicago. Ill. 166 pages. Spiral bound, heavy proxlin coated paper cover. Price, \$2.00.

Ideally adapted for use by individuals



GOLCONDA Diamond Tools

POLYPOINT truing and dressing tools, with 3 or 7 diamonds, assure highest efficiency on any quality production set-up.

SINGLEPOINT tools in all sizes, in any holder. Superior settings—forged steel, alloy and sintered settings. GOLCONE—Shaped cone pointed diamond tools. Quality work and efficient service for over 18 years. Immediate delivery on standard tools.

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GOLCONDA DIAMOND PRODUCTS CORP. 2212-16 W. Armitage Ave. CHICAGO, ILLINOIS



for home-study and reference work and for use in apprentice training school, evening schools, vocational and trad schools as well as National Defense Training Classes, "Machine Blueprint Reading" is a "how-to-do-it book which starts with the fundamental principles and in a step-by-step manner proceeds to actual production blueprints. The first part of the book has been designed to teach all the basic information necessary to interpret a print. It covers the alphabet of lines. the methods of projection, relationship of views, and an understanding of dimensions. The book contains a variety of different types of problems in order to bring out the use of different lines. The glossary of shop terms which is presented in the beginning contains important information, as these various terms appear on drawings, and an understanding of their

Problems in shop arithmetic have been introduced to review the manipulation of numbers. fractions, and decimals and their application to the checking of dimensions. This practical use of the elementary functions of arithmetic brings out clearly the extent of the reader's understanding of fractions and decimals and may reveal the need for

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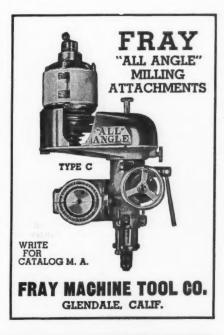
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Following the beginning prints (which are used to illustrate the principles of projection or standards of drawing practice), a large number of production blueprints are shown. The prints used in the text have been taken from industry—prints of the type the reader will actually use on the job. A question sheet with space for writing in the answers accompanies each print. The answers and solutions to all questions are contained in a separate packet given with the book.

Patent Fundamentals. By Leon H. Amdur. Published by Chemical Publishing Co., Inc., 148 Lafayette St., New York, N. Y. 305 pages, 5½ x 8½ in. in size. Bound in cloth. Price, \$4.00.

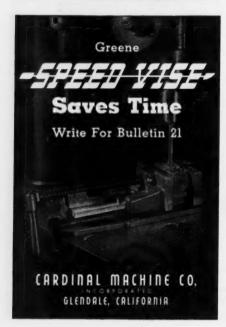
"Patent Fundamentals" assumes a minimum of initial knowledge on the part of the reader, and presents the "whys" and "hows," as well as the "whats" of patents The book is written in a simple and lucid manner and yet in sufficient measure so that the industrialist, the engineer, and the student may be enlightened on the funda-











mentals of a subject which is of vait and still-growing importance to our economic life. In addition, the author has fruction included a large number of specific welding included a large number of specific er. amples which enable the reader to study the applications of the basic principles of patent law. He has also given a survey of Patent Office organization and procedure.

The book has two major aspects and a number of minor ones. One of its chief purposes is to enable the layman and the student to attain a rapid, yet sound understanding of the U. S. Patent System. This would include enlightment as to what can be patented (Chapter I), the purpose and operation of Letters Patent, including a discussion of statutory bars (Chapter II) and what innovations and improvements consti- dge of v tute invention (Chapter VI).

The preparation and prosecution of an actual U. S. Patent, with reproductions 88 su of all papers and memoranda, is fully and econ set forth in Chapter IV. The layman, inventor, or student should find much information in Chapter III concerning the manner in which patents are classified and how patent searches are conducted. Chapter V explains briefly the function and drafting of patent claims, and Chapter IX explains incidental matters such as assignments and licenses, shop-rights, patent markings, and so on

The second dominant appeal of the book is to those already versed in the intricacies of patent law. Patent attorneys and inventors will find a philosophical and historical treatment of the difficult science of patent classification velds, c in Chapter III, "How Patents are and inviti Chapter IV, "What is Invention?," of rearing great help in explaining to their clients. or in expounding to the court, what accomplishments rise to the dignity of invention and what are merely instances of mere mechanical skill. The so-called "negative rules of invention" are set forth and illustrated by one or more court decisions, with reproductions from the patent and drawings considered by the court in reaching its decision.

Lessons in Arc Welding. Published by The Lincoln Electric Co., Cleveland Ohio. 176 pages, 6 x 9 in. 170 illustra-Semi-flexible simulated leather tions. cover, gold embossed. Price, 50c.

This book makes available to industry and engineering colleges and universi-

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"Lessons in Arc Welding" consists of series of 60 lessons

various electrodes for hard surfacing. Text explanations are graphically supplemented by by-line drawings and photographs for ready understanding.

A valuable feature of the book is a set of questions and answers for each lesson which enable the student to check his knowledge. This question and answer section is contained in 25 pages, with 18 pages of questions and 7 pages of answers. Since the questions are headed by the lesson number and subject matter, they can be of assistance in furnishing the solution to problems.

IF it's gages you

here are time savers you should know about

> 5 to 10 times faster and much more certain inspection

Four very efficient models selected from a great many different Federal gages hundreds in fact - which Defense Work is using 24 hours a day to speed production.

We can't list all of them here, but ask us what we have.



Measuring end of a Gun Bore Gage for "lands" - and "grooves." Smooth work-ing, sensitive and accurate. "Repeats"

A Snap Gage that checks 3 simultaneously. diameters Extra fast, sensitive and accurate.



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over welding with ectrodes for varius purposes, and essons 50 to 60

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uly, 1941 July, 1941

New Nesting Type Tote Pans



20" long x 12" wide x 61/2" deep. 16 ga., drag holes and handles both ends.

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GERSTNER Tool Chests are Good Chests



They are made better, and are attractive in design and finish. Will Please the Man Who Cares Most. Machinists and toolmakers write for free Catalog.

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Factory Installation Work. By A. s a bo Coker. Published by Chemical Publishing Co., Inc., 234 King St., Brookly of the N. Y. 240 pages. 103 diagrams as photographs. Semi-flexible board coven by Price, \$2.50.

The material in this book has bee raftsm compiled with the object of bringin for whe together in a convenient form up-to shop. date and reliable information on the to the tire range of electrical installation working an which is peculiar to the electrical equipreived ment of works and factories. Factor texts ar sub - stations, distribution switchgen It is t and cables, motor control gear, an he you lighting and heating distribution di reading cuits form the main subjects. Relate has only subjects such as power factor corre uries re tion equipment and earthing and pr tective devices are also included.

The book should be particularly us ful to electrical installation engineer and contractors, plant engineers, as works electricians.

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Gears and Gear Cutting. By F. Looks, *Camm. Published by Chemical Publishing Co., Inc., 234 King St., Brookly hem in N. Y. 144 pages, over 100 illustration difficult Cloth binding, board covers. Priz

"Gears and Gear Cutting" is an informative book dealing with methof for cutting all types of gears, including spur gears, helical gears, worm gear bevel gears, spiral and screw gear. The book includes all formulas, table and information on the making of an mills, hobs, and gear generating of ters.

Contents of the book are as follow Types, Cutting Methods and Term Bevel Gears; Worm Gears; Gear Gea ation; Gear Wheel Forms; Epicyc Gear Trains; Methods of Mounting Hobs; End Mills and Generating Caters; Load Capacity of Gears; The Eficiency of Gears; Useful Formulas in Gears.

A Good Mechanic Seldom Gets Int. By Herman R. Graman, Machine Sin Instructor and Assistant Supervisor National Defense Training, Park Voctional High School, Dayton, Ohio. Pulished by American Technical Societ Drexel Ave. at 58th St., Chicago, III. I pages. Spiral binding, cardboard cover Price, 50c.

"A Good Mechanic Seldom Gets Hur

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MODERN MACHINE SHOP

CLEVELAND, OHIO

EAST 61st STREET

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By A. 1 is a book on rules and precautions for cal Publish personal, tool, and machine safety. Most on Brookly of the rules in the book are not new. Broakly of the author has endeavored to take the board cover as them so as to give the beginning at them so as to give the beginning. k has bee craftsman an idea of what to look out of bringin for when he is working in a machine form up-h shop. Some of these rules have come to the author from personal observation and experience, others were relation was

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Mechanism. By Stanton E. Winston. n engineer Aublished by American Technical So-ineers, an riety, Drexel Ave. at 58th St., Chicago, III. 372 pages, 199 illustrations. ble cloth binding. Price, \$3.50.

Another in the series of "how-to-do-it"

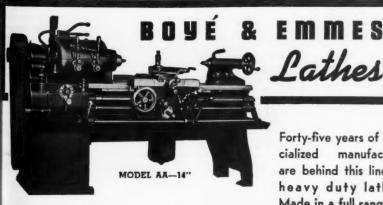
By F. 1900ks, "Mechanism" goes to the root mical Po of all important points and explains, Brookly them in a clear and practical manner. Illustration Difficult points are based on something

the reader already knows which enables him to gradually build up his knowledge of mechanism, with each new step made easier by careful association with some factor that is already thoroughly understood.

The old troubles associated with the mathematical phase of mechanism have been eliminated. Instead, each mathematical principle is developed by actually showing the reader how the complete calculation was conducted. The development of the formula, how the conditions at hand are substituted in the formula, and how the solving is done are shown.

After each new principle has been explained, illustrative examples are presented and solved as a means of showing the application of the principle. Thus, each principle is explained by (a) written explanations, (b) pictures or line drawings, and (c) by illustrative problems.

Furthermore, there are 250 practice problems, all of which are said to exactly fit the explanations of the principles. In every respect, "Mechanism" should make an ideal book for homestudy, reference, classroom, and National Defense Training use.



Forty-five years of specialized manufacture are behind this line of heavy duty lathes. Made in a full range of

sizes-from 14" to 36"-each of outstanding power, accuracy, range and economy.

THE BOYE & EMMES MACHINE TOOL CO.

July, 194 July, 1941

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Free Literature

Wittek Roll Feeds. Complete information on Wittek Automatic Roll Feeds for punch presses is contained in a 24page bulletin designated as the WF-339 which is now being issued by the Wittek Mfg. Co., 4305 W. 24th Place, Chicago, Ill. The bulletin features several schematic views of the Wittek Roll Feed giving general dimensions and illustrating methods of assembly, adjustment, and so on.

Bulletin WF-339 also includes infor-

mation on Wittek Reel Stands for handling coil stock or wire in the feet ing of punch presses. A price list a inquiry form for convenience in detail ing feeding problems are also include in the bulletin, copy of which is available from the Publicity Section, With Mfg. Co., at the above address.

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"P-Q Your Key to Increased Produ tion." An eight-page folder entiti "P-Q Your Key to Increased Produ tion" and now being published by Sun Oil Co., Philadelphia, Pa., stress the importance, particularly at t time, of the added man-hours and m chine-hours that can be obtained throu the use of more efficient petrole products. The folder points out how t output of present production equipme can often be substantially increased modern petroleum products and en neering services that are immediate available to all industries.

The folder states that a high "Por Production Quota is obtainable of when men, machines, and petrole products are all functioning efficient It puts emphasis on the necessity utmost care in selecting the best pos ble cutting oils, lubricants, or proce ing oils for each specific job, bearing, operation. The folder calls attention case histories, facts, and figures sho ing how Production Quota incress have been obtained by changing in one petroleum product to another. folder also invites consultation Sun's technical field representatives specific recommendations on any lub cating problem. Copy free upon reque

"B-3" Beverly Throatless Shear is subject of an illustrated bulletin leased by the Beverly Shear Co., I





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WOOD makes a clumsy tool that will split and crack. METAL

has edges that turn, break and fly off. RUBBER

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e Chicago Rawhide Ham-mers and Mallets are the tools for striking hard ac-curate blows safely on any surface that must not be cracked, battered or marred. The tough Java Water Buffalo hide, coiled, compressed and treated for long life will not split, break or even dent, and has resilience to absorb rebound for easier, accu-



ELSTON AVE - CHICAGO - U-S-A-

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BENDERS SPECIAL TOOLS

PUNCHES and DIES for and other round, square shaped holes. Catalog sent on request.

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MODERN MACHINE SHOP

Stands fo in the feet rice list a ce in detai also include nich is avai ction, Witte ress.

ased Produ ucts Company, 30 E. 42nd St., New der entitie York, N. Y. The booklet describes the sed Produ many advantages of oxy-acetylene cutting with portable machines, the diversity of opershed by t Pa., stres rly at t ations which can urs and m be performed, ined throu and a variety of t petrolei applications. Sevout how t eral new profitn equipme able "hints and increased kinks" on the s and en use of these maimmediate chines have been

added. high "P-(The general ainable or operations possid petrole ble-straight-line g efficient cutting, bevel-cutecessity ting, shape - cutbest po ting, circle - cutor proce ting, and heavy bearing, cutting-are illusattention trated and a numgures sho ber of views of a incres cut edges are inging fr given to illustrate nother. I the results of cortation w rect and incorrect ntatives ! cutting techany lub niques. In addipon reque tion, some typical applications in the aircraft and Shear is bulletin ! automotive indusr Co., tries, iron and locomotive works. machine shops, job welding shops, HINE (A shipyards, and steel mills are listed. The section on suggestions for extending the usefulness of portable machinecutting has been enlarged, and a

W. 111th St., Chicago, Ill. The bulletin covers the construction features, application, and specifications of the shear and is available free upon request.

Portable Machine-Cutting. A revision

of the booklet "Opportunities for Profits with Portable Machine Cutting" has

been announced by The Linde Air Prod-

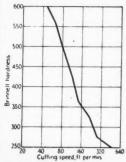
tracing has been included. Copy of the booklet, Form 4062B, free upon request.

Westinghouse Seam and Spot Welding Leaflet. Useful information on the technique of seam and spot welding is given in a four-page leaflet announced by Dept. 7-N-20, Westinghouse Electric & of Descriptive Data 18-333 free upon

Mfg. Co., East Pittsburgh, Pa. request



Use KENNAMETAL at High Speeds for Maximum Operating Efficiency



Machining Speeds with KENNA-METAL on steels of various hardnesses.

Although the anti-frictional properties of KENNAMETAL permit it to be used at slower speeds than other carbides without "galling" or "pick-ing up," best results are obtained when KENNAMETAL-tipped tools are used at two to six times greater speeds than high speed steel tools. The graph at the left shows the customary speeds for machining commercial steels, such as SAE 1045, 3140, and 4320, with KENNAMETAL.

Deliveries of standard KENNA-METAL tips are now being made within three to four days upon receipt of order; deliveries of standard and modified standard tools within ten

days (except for unusually large orders). Write for Catalog 41 listing specifications and prices on standard tools and blanks.

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July, 19

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A.C. Adjustable Speed Drive. A fourpage bulletin describing a.c. adjustable speed drives between 1 and 15 h.p. for use over a wide speed range has been issued by Dept. 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Copy of Bulletin DD-4063 free upon request.

Fellows Flame Hardener, an automatic time-controlled machine for heating ferrous materials to be locally hardened is the feature of a 12-page catalog released by The Fellows Gear Shaper Co., 78 River St., Springfield, Vt. The catalog contains illustrations and detailed descriptions of the unit as well as informative tables and complete specifications of the machine. free upon request.

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Niagara Power Squaring Shears is capacities from 10-gauge to 1/2 in. inclusive are covered as to construction for the gri tures, uses, operation, specifications, and free up so on, in a 24-page profusely illustrated bulletin issued by the Niagara Machine & Tool Works, 637-697 Northland Ave. Buffalo, N. Y. Copy of Bulletin 72-8 free upon request.

Oxy-Acetylene Welding and Cutting Equipment. A 12-page illustrated book "What let, the Purchasing Agent Should Know About Oxy-Acetylene Welding and Cutting Equipment and Processes," has been announced by The Linde Air Products Company, 30 E 42nd St., New York, N. Y. The booklet is designed to help the user or propective user obtain a clear understanding of the oxy-acetylene process and the various construction and operating features of welding and cutting apparatus used in applications of the proess. It contains a guide to the selection of the proper type of equipment with a check list of important points is consider in selecting welding and cutting blowpipes, cutting machines, regu lators, and acetylene generators. Alm included is a listing of some of the modern applications of the oxy-acetylene flame, suggesting many uses to which it may be put. Copy of the book let, Form 4694, free upon request.

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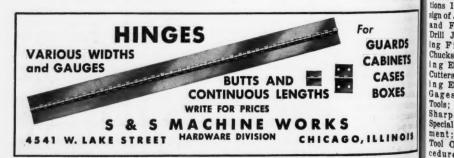


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"Grits and Grinds" Vol. 32, No. 4 has as its feature two articles, one on abrasive cut-off wheels in the foundry and the other on the development of modern abrasives. Both articles contain The publication, several illustrations. which is issued monthly by the Norton Company, Worcester, Mass., also includes two short illustrated descriptions of methods for speeding up piston grinding and for ensuring concentricity in uction feet the grinding of starter gear hubs. Copy free upon request.

ardization; Magnetic and Pneumatic Gripping Materials.

"Important Facts on Chamfering" is the title of a six-page illustrated bulle-tin released by W. C. Lipe, Inc., 208 S. Geddes St., Syracuse, N. Y., containing complete information on the Lipe High Speed Heavy Duty Gear Tooth Chamfering Machine as to features, opera-tion, specifications, uses, and so on. Copy free upon request.

Jigs, Tools and Fixtures. Second Edition. By Philip Gates. Published by the Chemical Publishing Co., Inc., 234 King St., Brooklyn, N. Y. Cloth bound. 209 pages, numerous illustrations, diagrams, and tables. Price, \$4.00.

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This book covers the drawing and design of equipment for practically all modern machine tools, with chapters on special equipment and drawing office procedure. It also gives numerous examples from practice. Contents are as follows: Mechanical Drawing, Sketching: First Considerations In the Design of Jigs, Tools and Fixtures: Drill Jigs; Milling Fixtures; Chucks and Turning Equipment: Cutters; Screwing Equipment: Gages; Press Tools; Brown & Sharpe Cams: Special Equip-ment; Jig and Tool Office Procedure; Stand-



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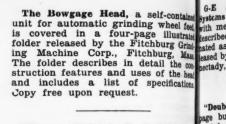
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brings all adjustments under absolute micrometric control of the operator without stopping tool or machine. In Jig Borer, Milling Machine or Hori-zontal Boring Mill, it bores, faces, counterbores, turns outside diame-ters, mills flat surfaces and slots, under-cuts, recesses, back-faces and does an almost limitless range of "headache" jobs. Send for bulletins. Address all communications, inquiries and orders to

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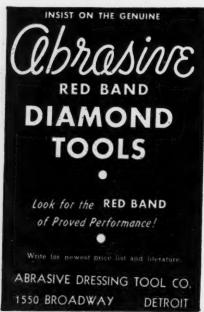
"How to Maintain D. C. Motors" is Ave., D tures th the title of an eight-page illustrated booklet, designated as the GEA-386 which is now being published by the General Electric Co., Schenectady, N.I. which is now being published by the ting next General Electric Co., Schenectady, N.1 The booklet gives a detailed answer ways, to this subject, stating principally the periodic inspection of motors assure dies or longer life and helps minimize production and specific productions of the production of motors and specific productions of the production of longer life and helps minimize production interruptions. A trouble correction free upo chart for d.c. motors is included in the booklet, copy of which is available free upon request.

Heald Internal and Surface Grinding Machines and Precision Boring, Facing and Turning Machines for toolrooms and miscellaneous work are presented by means of descriptions and photograph in an 18-page bulletin prepared for di-tribution by The Heald Machine (a. Worcester, Mass. Photographs show w rious applications of the machines. Specification highlights of each machine an included. The center spread of the buletin contains a complete listing of the Heald line. Copy of Bulletin 1-9, Issue 1, free upon request.

Atlantic 1941 General Catalog. The Atlantic Gear Works, 204 Lafayette St. New York, N. Y., has issued a 1941 General Catalog on stock gears, sprockets and chains, reducers, bearings, and couplings. Included are full specifications and prices of pinion rod, racks ratchets, internal gears, special gean spiral and helical gears, worm gean bevel and miter gears, and other pro-The catalog also contains complete information regarding special serices rendered regularly by the Atlantic Gear Works.

A special supplement has been at tached to the catalog listing the type of equipment that the company now be available for special work. Copy of catalog free upon request.





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July, 1941

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"Double Duty" is the title of a fourge bulletin released by the Experimental Tool & Die Co., 12605 Greiner illustrated Ave., Detroit, Mich. The bulletin fea-GEA-346 tures the Universal Slotmaster, a slotned by the ting head which can be adapted to all tady, N.7 milling machines for use in cutting keyed answe ways, templets, splines, internal gears,
ipally the and for slotting out precision blanking
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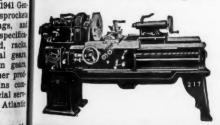
6 & N Diecasting Machine Catalog. The G & N Mfg. Co., 11610 Madison Grinding Ave., Cleveland, Ohio, is now distribut-ig, Facing ing a catalog on G & N Diecasting Marooms and chines. The catalog consists of a series of loose-leaf pages which are fastened in a cardboard cover.

In addition to five pages describing and illustrating the features of G & N Diecasting Machines, the catalog includes an unfolder containing complete photo-diagrams and specifications of a combination machine for zinc-tin-lead and aluminum-brass-magnesium applications. Copy free to mechanical executives upon request.

"The Deep Drawing, Shearing and Perforating of Monel, Nickel and Inconel" is the title of a 12-page technical bulletin released by the Development and Research Division, The International Nickel Co., Inc., 67 Wall St., New York, N. Y. Designated as the T-19. the bulletin covers the shearing and perforating of the high nickel alloys, and contains information on the mechanical characteristics of the high nickel alloys as compared to other materials commonly used in deep drawing. It covers die materials, lubricants, and drawing practice, along with general information on annealing and pickling of Monel. nickel, and Inconel. Copy of Bulletin T-19 free upon request.

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July, 1941

MODERN MACHINE SHOP

CATALOG LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed,

1. Lathe Pans, Gear Guards

New bulletins featuring Littleford lathe pans, gear guards, machine bases, splash guards and louvre covers are available from Littleford Bros., 433 E. Pearl St., Cincinnati, Ohio.

2. Hoists, Electric

Catalog H-40, issued by American Engineering Co., 2435 Aramingo Ave., Philadelphia, Pa., describes the construction, operation and application of Lo-Hed monorail electric hoists.

3. Carbo-Lathe

W. C. Lipe, Inc., 208 S. Geddes St., Syracuse, N. Y., has issued new circular illustrating and describing the Carbo-Lathe.

4. Flame Hardener

A new 12-page catalog featuring the Fellows Flame Hardener, an automatic time-controlled machine for heating parts to be locally hardened, has been released by The Fellows Gear Shaper Co., Springfield, Vt.

5. Grinders, Buffers, Drills

Electric grinders, buffers, drills, etc., are illustrated and described in new 36-page Catalog No. 43 now being distributed by The Standard Electrical Tool Co., Eighth and Evans Sts., Cincinnati, Ohio.

6. Oil and Grease Cups

284

Bulletin featuring Bowen Empress Lubricating Devices, standard stock items, is available from Bowen Products Corp., Ecorse, Mich.

7. Hydraulic Equipment

Hydraulic hand jacks, porto-poweremote-control jacks, maintename assortments, and pipe and conducted benders are illustrated and describe in Catalog No. 41H, issued by Bladhawk Manufacturing Co., Dept. P2461, Milwaukee, Wis.

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8. Tri-Clad Electric Motors

New 12-page bulletin, illustrating and describing the new G-E To Clad Motors, is available from Gental Electric, Schenectady, N.Y.

9. Milling Cutters

Helpful data, descriptions and illustrations are contained in new callog No. 26, featuring Lovejoy Ming Cutters. Lovejoy Tool Company Inc., Springfield, Vt.

10. High Speed Cold Saw

New 8-page bulletin illustrating all describing Motch & Merryweather Cold Sawing Machines, also Mil Automatic Saw Grinder, is available from Motch & Merryweather Michinery Co., Penton Bldg., Clerk land, Ohio.

11. Grinding and Lapping Compound

New 28-page catalog includes princludes on Clover grinding and lapping compound . . . also coated abrasiva Clover Mfg. Co., Norwalk, Conn.

2 48 .00

12. Chrome Plated Gage Blocks

Dearborn Gage Co., 22038 Beech S. Dearborn, Mich., has issued and catalog and price list featural Dearborn chrome plated gage block

13. Tool Chests

Bulletin containing illustrations, descriptions and prices on GS Machinists' Tool Chests has been issued by George Scherr Co., Inc., 130 Lafay-ette St., New York, N. Y.

14. Coolant Pumps

Bulletin N-B541 illustrates and describes the Brady-Penrod line of coolant and circulatory pumps. Brady-Penrod, Inc., Muncie, Ind.

5. Live Centers

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Motor Tool Mfg. Co., 12282 Turner Ave., Detroit, Mich., has available bulletin illustrating and describing line of live centers.

16. Turret Lathe

Descriptive bulletin featuring Simmons No. 2 Turret Lathe has been issued by Simmons Machine Tool Corp., 1745 N. Broadway, Albany, New York.

17. Milling Fixtures and Dividing Heads

Hart Machine Co., 24 Mather St., Dorchester, Boston, Mass., has available bulletins detailing Hart Milling Fixtures and Dividing Heads.

Company 18. Drill Grinder

Details on the Star Precision Drill Grinder are presented in folder issued by Star Machine & Engineering Corp., Bloomfield, N. J.

19. Watchman's Clock

Detex Watchclock Corporation, 76 Varick St., New York, N. Y., has issued a folder detailing the Detex Alert precision built watchman's clock.

20. Collapsible Taps

Bulletin M-111, illustrating New and describing Modern Collapsible Taps, Stationary and Rotary, is available from Modern Tool Works, Rochester, N. Y.

21. Kennametal Tools and Blanks

New Catalog No. 41, featuring Kennametal steel and metal cutting tools and blanks, has just been released by McKenna Metals Co., Latrobe, Pa.

22. Collet Chuck

New folder detailing the Erickson Precision Collet Chuck has been issued by Erickson Steel Co., 80th and Bessemer Ave., Cleveland, Ohio.

23. Burs and Cutters

New catalog DSB-27, issued by Grobet File Corp. of America, 3 Park Place, New York, N. Y., shows the complete line of small Grobet Burs or Cutters with 1/8" and 3/32" shanks.

Print plainly in filling out coupon for literature.

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Duro Power Tool Catalog E-41-A. Duro Metal Products Co., Dept. MM-1, 2657 N. Kildare Ave., Chicago, Ill., has prepared a 1941 catalog covering the Duro complete line of power-driven machinery. Designated as the E-41-A, this 56-page, profusely illustrated catalog contains complete information on table saws, jointers, drill presses, band saws. shaper-carver-routers, scroll saws, flexible shafts, lathes, power grinders, sanders, electric drills, hand grinders, accessories, V-belts and pulleys, and motors. Copy free to mechanical executives upon request.

The Desmond-Stephan Mfg. C log. Urbana, Ohio, is now publishing a page catalog describing and illustration Simplex Steel Slide Vises. In addition to listing a complete line of machinis and combination pipe vises, the catal includes a line of production, welden filers', and drill press and milling m chine vises, also vise jaw covers brass and copper. Copy free upon quest.

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"For (Grinder) Men Only." With no workmen operating expensive machine industry today must pay the cost mishandled small tools. Here is a page booklet published by Koebel Di mond Tool Co., 9350 Grinnell Ave., D troit, Mich., expressly for the workman Simple wording and drawings tell how to handle a diamond tool so the it will give maximum service. Co free to any plant executive upon quest.

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Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S. Inexpensive - Last for years. Write for Circular

> "Budgit" Hoists. An eight-page illu trated bulletin on "Budgit" Portal Electric Hoists is now being distribute by Shaw-Box Crane & Hoist Division Manning, Maxwell & Moore, Inc., 4 Broadway, Muskegon, Mich. Safety in tures, mechanical advantages, specific tions, outline dimensions, and so on, The bullet the hoists are covered. also illustrates and describes vario accessories for the "Budgit" Hoists a contains numerous illustrations show ing the hoists at work in various dustries. Copy of Bulletin No. 348 in

NIELSEN TOOL 1863 Gardner Ave. Berkley, Mich.

upon request.



Norton Abrasives for Portable Gin ers. Norton Company, Worcester, Mass is now issuing a 26-page booklet having as its feature an article on grinds and finishing with portable grind The article using Norton abrasives. lustrates and describes the use of su grinders in the foundry cleaning m steel mill, railroad and car shop, st industry, toolroom and die shop, and grinding and finishing welds. The ter few pages of the booklet are devol to illustrating and describing North Mounted Wheels and Mounted Point Copy free upon request.



MODERN MACHINE SHOP

July, 1

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Dearborn Chrome Plated Gage Blocks are the subject of a 28-page illustrated catalog and price list now being dis-tributed by the Dearborn Gage Co., 2005 Beech St., Dearborn, Mich. Copy free upon request.

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GS Tool Chests. Literature describing and illustrating a line of GS Tool Chests for toolmakers, machinists, apprentices, craftsmen, and so on, is now available from the George Scherr Co., 130 Lafayette St., New York, N. Y., free upon request.

"Better Casters" is the title of a four-page folder now being published by the Metzgar Co., 112½ Logan St., S. W., Grand Rapids, Mich, illustrating and describing two complete lines of indus-trial truck casters, all of which are fitted with floor-protective "Metzgar" End-Wood Wheels from 21/2 to 10 in. Copy of folder free upon request.

Norgren Pneumatic Products Catalog No. 400. In this 24-page catalog, publication of the C. A. Norgren Co., Inc., 216 Santa Fe Drive, Denver, Col., a complete line of Norgren Lubro-Control Units for the control, cleaning, and lubrication of air wherever it is used in industry is featured. A second distinctive feature of the catalog is the Norgren system for oiled-air lubrication for high speed spindle bearings. Various other Norgren pneumatic equipment is also illustrated and described. Copy of Catalog No. 400 free upon request.

Lovejoy Milling Cutter Catalog No. 26. Lovejoy Tool Co., Inc., Springfield, Vt., has published a 22-page catalog covering its complete line of positively locked inserted tooth type milling cutters for modern metal-cutting requirements. The catalog illustrates and describes face milling cutters, side milling cutters, plain or face milling cutters, plain arbor mills, staggered tooth grooving mills, deep slotting cutters, half side mills, special milling cutters, and so on, as well as multiple cutter boring heads, taper shank arbors, special counterboring tools, and turret tool posts. Copy free upon request.

Fellows Involute Measuring Machine. The Fellows Gear Shaper Co., 78 River St., Springfield, Vt., is now distributing a 12-page, profusely illustrated catalog containing complete information on its involute measuring machine for charting involute profiles. Copy free upon request.

Holo-Krome Catalog of Socket Screw Standards. The Holo-Krome Screw Corp., Hartford, Conn., is now publishing a 12-page, 81/2 x 11-in. catalog of socket screw standards. The catalog includes standards (approved American Standards Association sponsored by the Society of Automotive Engineers and The American Society of Mechanical Engineers) socket set screws, socket head cap screws, and socket screw keys and the formulas for determining all dimensions, together with screw thread data and thread and body length tolerances. Copy free upon request.

Oakite Cutting and Grinding Com-Production superintendents, works managers, and other manufacturing executives of plants working on defense orders or normal peace-time products where cutting and grinding are prime production operations will be interested in a 20-page booklet prepared for distribution by Oakite Products, Inc., 57 Thames St., New York, N. Y. The booklet concisely outlines 53 different formulas for machining ferrous and non-ferrous steels of various types, copper, brass, bronze, and aluminum alloys. It also describes the advantages provided by Oakite Cutting and Grinding Compounds in connection with cutting, wet grinding, light broaching, milling, drilling, cold sawing, threading and tapping, and many other machining operations.

Considerable supplementary data is also given on several related subjects. Included among these are drawing and stamping compounds, rust-proofing iron and steel parts between manufacturing operations, cleaning and disinfecting cutting and grinding solution tanks and lines, lubrication of certain metal parts before succeeding operations, and preparing surfaces of steel products for black finishing processes. Copy of booklet free upon request.



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"More for Your Control Dollar" is the title of a 12-page catalog now being issued by the General Electric Co., Schenectady, N. Y., illustrating and describing G-E Combination Starters and their application to gas utilization industries, textile industries, coal industries, automotive industries, paper mills, oil fields, and so on. Copy of Catalog GES-2456 free upon request.

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Westinghouse Spot Welding Timers. Ignitron Spot Welding Timers to control welding of aluminum, heat-treated alloys, and other materials are described in a leaflet announced by Westinghouse Electric & Mfg. Co. Application, distinctive features, and construction are discussed. Tubes and other important parts are described.

Operating details list the functions of tubes and relays and explain how stepless welding is obtained. Outline sketches give physical dimensions and show position of conduit connections.

Copy of Descriptive Data 18-335 may be obtained from Dept. 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pennsylvania.

Carboloy Milling Cutter Grinding Manual. A complete shop manual on grinding practice in connection with cemented carbide type face mills and end-cutting tools has been prepared for distribution by the Carboloy Co., Inc., 11143 E. 8 Mile Blvd., Detroit, Mich. Representing the findings of several years of extensive field as well as laboratory research on cemented carbide milling cutter grinding practice in relation to cutter performance, the manual offers a complete and detailed guide to maintenance of such tools.

Designated as Bulletin No. GT-127 the manual comprises some 20 pages and is accompanied by two 21 x 15½-in. charts illustrating the complete grinding procedure. It covers every variable involved from selection of grinding wheel type, shape, and speed to recommended tooth profiles for different purposes and different forms of milling cutters and end-cutting tools. The manual takes into account the various types of tool grinders on the market, illustrating the method to be pursued on each type to obtain the best performance with the various cutters. Copy free to mechanical executives upon request.

Ampco "Selector of Physical Properties." Ampco Metal, Inc., Milwaukee. Wis., is now distributing a cardboard slide selector by means of which the physical properties and chemical composition of all grades of Ampco Metal may be quickly ascertained by manipulating the cardboard slide. The reverse side of the selector contains a table listing the general uses of the alloy by grades. Thus, a prospective user with the problem of selecting a metal for a certain part can easily find those grades of Ampco usually employed in the application and then by setting the "Selector of Physical Properties" can check to discover which grade most closely meets his requirements.

An Ampco "Selector of Physical Properties" will be sent free of charge to any mechanical executive upon request.

Clover Catalog and Price List. Clover Mfg. Co., Norwalk, Conn., announces the publication of a 28-page catalog and price list of Clover Coated Abrasives and Grinding and Lapping Compound. In preparing this publication, every effort has been made to enable the reader to find easily the data he is seeking. Complete information on the types. grades, backings, sizes, and prices of each class of coated abrasive goods has been arranged for quick reference. In the same way, data are given on the different grades, weights, prices, and uses of Clover Grinding and Lapping Compounds.

The catalog includes 12 pages of helpful engineering information, covering such important factors as coated abrasive backings, coatings, flexibility, applications, as well as valuable suggestions on how to order and store abrasive products. To the user who is trying to determine whether to employ an aluminum oxide coated abrasive. or silicon carbide, or other material, the catalog is said to offer sound, practical recommendations. It contains interesting discussions of such significant items as when and where to use open coats, how to order correctly, and so on.

An identification table listing the trade names under which different brands of coated abrasives are sold and the corresponding abrasive products to which such trade names apply, as well as a comparative grading chart, is also included in the catalog, copy of which can be obtained free upon request.

